

SONY

VTR IN CAMERA

BVW-400A/400AP



BETACAM SP

OPERATION MANUAL

English

1st Edition (Revised 2)

Serial No. 10001 and Higher (BVW-400A)

Serial No. 40001 and Higher (BVW-400AP)

For customers in the USA

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

For customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

Pour les utilisateurs au Canada

Cet appareil est conforme aux normes Classe A pour bruits radioélectriques, spécifiés dans le Règlement sur le brouillage radioélectrique.

X-RAY RADIATION WARNING

Be sure that parts replacement in the high voltage block and adjustments made to the high voltage circuits are carried out precisely in accordance with the procedures given in this manual.

LITHIUM BATTERY

Should only be changed by technical personnel.
There is a risk of explosion if handled improperly.

VARNING

Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt fabrikantens instruktion.

ADVARSEL!

Lithiumbatteri—Eksplosionsfare
Udskiftning må kun foretages af en sagkyndig,
og som beskrevet i servicemanualen.

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About this Manual

This section discusses the purpose and organization of this manual which is a guide to the use and operation of the Sony BVW-400A/400AP VTR in camera. Reading this section first will help you to decide just which other chapters you should read most carefully, depending on your degree of experience of using an integrated VTR camera.

Purpose

This manual contains all the information you need for operation of the BVW-400A/400AP, including the terminology used for various component parts, and details of settings and adjustments. It also describes how to get the maximum benefit from exploiting the many features of the unit, by adding some of many separately available accessories, and by adding an external VTR for simultaneous recording, for example.

In addition to this operation manual, the BVW-400A/400AP is supplied with a maintenance manual, which explains how to use the self-diagnosis functions, and gives details of the internal circuits and switch settings.

Organization

There follows a brief summary of the chapters of this manual, but note that the opening page of each chapter also gives a summary and list of the contents of that chapter.

Chapter 1 General

Describes the principal features of the unit, and gives a recommendation about system configuration.

Chapter 2 Location and Function of Parts and Controls

Gives the names and function of the controls and other parts, and how to use them. For experienced users of a broadcasting integrated VTR camera, a reading of this chapter, in conjunction with occasional reference to the other chapters should be sufficient to start using the unit.

Chapter 3 Setting Up the Unit

Gives some important precautions about use of the unit and covers setting up the power supply and mounting the lens. Also explains how to attach accessories to make the camera even easier to use, and the use of an external VTR.

Chapter 4 Warnings and Indications in the Viewfinder and Display Panel

Explains the messages and other indications which appear in the viewfinder and on the display panel, to show the audio level, amount of tape remaining and so forth.

Chapter 5 Adjustments and Settings for Recording

Describes how to adjust the black balance, white balance and sound level, for high quality recording, and how to set the shutter speed and time code.

Chapter 6 Recording and Playback

Gives the basic operations for recording and playback, including making recordings continuous, and how to play back to check the contents of a recording.

Chapter 7 Recording on an External VTR

Explains how to connect an external VTR, and the methods of component format recording and composite format recording, and also how to record simultaneously on the internal VTR and an external VTR.

Appendix

- **Operation Warnings**

Table of the meanings of the lamps, indicators and alarm sounds.

- **Specifications**

Lists the specifications of the video system, audio system, power supply, and operating conditions.

- **Testing the Unit before Shooting**

Checklist of things to do before setting off for a shooting session. Essential reading for all users with limited experience of a professional integrated VTR camera.

- **Maintenance**

Procedures for cleaning the video heads and viewfinder.

- **Glossary**

Explains the meanings of technical terms used in the video camera and VTR technologies.

Intended audience

The BVW-400A/400AP unit is designed for use principally by professional camera operators working in broadcasting or production companies. This operation manual therefore assumes a basic understanding of VTR and broadcasting technology, and experience of its use.

If you are used to operating an integrated VTR camera, you should read Chapter 2 "Location and Function of Parts and Controls" and then refer to other chapters as necessary. Regardless of experience, however, Chapter 1 "General" is essential reading, to ensure that you are aware of the many features of this unit.

If you are using this type of VTR camera for the first time, or have had limited experience of its use, you should preferably read through the entire manual.

Complementary information

Complementary information such as definitions of some relatively new technical terms of video technology are given as footnotes.

Referred information

This manual tells you, in italics, where to find additional information.

Note

Precautions to be taken in using the unit are provided where appropriate under the headings of **Note**. Be sure to read them as well as those set forth in Section 3-1 "Important Precautions" (page 3-3) so that you can obtain optimum performance with the unit.

Chapter 1

General

The purpose of this chapter is to give an overall impression of the features of the BVW-400A/400AP unit, and some configuration examples for its principal functions of ENG and EFP. To be able to fully exploit the benefits of the unit, you should at least read Chapter 1, irrespective of your degree of experience of professional integrated VTR cameras.

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1-1 Principal Features

1-1-1 Overview

The BVW-400A/400AP VTR in camera integrates a three-chip CCD¹⁾ color video camera, using the FIT²⁾ type Hyper HAD^{TM 3)} sensor CCD for high picture quality, with a Betacam SP (Superior Performance) video cassette recorder. The unit is compact and lightweight, at approximately 7 kg (15 lb 7 oz) when fitted with lens, cassette tape, and NP-1B/NP-1A battery pack (not supplied), and the power consumption using metal tape is only 22 W. The design combines ease of use with high functionality, making it ideal for one-person operation, and its waterproof and dust protective construction makes it able to withstand even adverse environmental conditions.

The high-grade image provided by the camera means that it is suitable not only for ENG (Electronic News Gathering) but also for EFP (Electronic Field Production).

The sensitivity of this unit is so high that you can get a clear image even at very low light.

The unit has built-in interfaces for external VTR; when connected with a special cable (not supplied), the external VTR can be used for recording instead of the built-in (internal) VTR. With a BKW-402 VTR connector unit (not supplied), simultaneous recording on both the internal VTR and an external VTR is possible.

1) **CCD:** Charge-Coupled Device

2) **FIT:** Frame Interline Transfer

3) **Hyper HAD:** Hyper Hole-Accumulated Diode.

“Hyper HAD” is a trademark of Sony Corporation.

1-1 Principal Features (Continued)

1-1-2 Camera Features

FIT type Hyper HAD sensor CCD

The FIT type Hyper HAD sensor CCD technology gives this camera best image quality as compared with (Sony's) existing CCD cameras. Its major achievements are:

- high sensitivity: 2000 lx at F8
- high S/N: typically 62 dB (BVW-400A), 60 dB (BVW-400AP)
- very low flare, and
- very low smear.

Built-in electronic shutter

When the built-in electronic shutter is used, even fast moving objects can be shot with very little blurring.

Also, you can use the electronic shutter in the following special modes:

- The Clear Scan™ (CLS)¹⁾ mode and the Extended Clear Scan (ECS) mode, which give you horizontal-streak-free images of computer screen displays whose scanning frequency has been causing horizontal streaks to appear in the reproduced picture.
- The Enhanced Vertical Definition System (EVS) mode which gives you sharp pictures with improved vertical resolution.

Switchable video gain

The video amplifier gain can be increased to +9 dB or +18 dB. Because of the high S/N ratio, even at +18 dB a high quality image is obtained, allowing shooting under very poor lighting conditions.

High performance viewfinder

- A quick start type of CRT is used, so that the image appears almost immediately after the power is turned on.
- The high resolution CRT gives a crisp image, so you can adjust the focus easily.
- A measure to substantially reduce flare is incorporated in the newly developed CRT.

1) **Clear Scan:** "Clear Scan" is a trademark of Sony Corporation.

-
- You can switch on and off the safety zone marker indicating the effective imaging area and the center marker indicating the center of the image.
 - The large aperture design gives a clear view, even with your eye away from the viewfinder.
 - The eyepiece is easily detachable. With the eyepiece removed, even from a distance the center of the image is still clear. The CRT screen and mirror can also be cleaned easily.
 - The viewfinder position is adjustable front to rear as well as sideways.
 - If you fit a BKW-401 viewfinder rotation bracket (not supplied), then when carrying the unit by the grip you can quickly fold the viewfinder away so that it doesn't keep hitting your leg.
 - The unit can easily be operated using your left eye for the viewfinder, by fitting a left-eyed shooting slide guide (Part No. A-7612-381-A, not supplied).
 - Fitting a fog-proof filter (Part No. 1-547-341-11, not supplied), prevents breath or vapor condensation.

Automatic adjustment of black balance and white balance and memory functions

A simple switch operation allows automatic adjustment of the black set, black balance and white balance. The adjustment settings are saved in memory, and retained when the power is turned off, so it is not necessary to make the adjustments every time the unit is powered on. There are two sets of memory for white balance, and each can hold four settings, making a total of eight. When you select the setting appropriate for the lighting conditions, the camera automatically adjusts to the white balance saved in memory. The unit also has preset white balances corresponding to color temperatures of 3200 K and 5600 K, which can be used when there is no time to make an adjustment.

VTR operation warnings

Warning lamps and a warning sound are provided to inform you of VTR faults, end of tape or battery low. The viewfinder also shows the tape remaining time and the remaining battery voltage.

Character display functions

The viewfinder can display switch settings, black and white balance adjustment information, warnings, and camera and VTR errors. If you connect an Anton Bauer Digital Magnum series battery using a special battery mount, the viewfinder screen can also indicate the power remaining in the battery.

1-1 Principal Features (Continued)

Automatic iris closing mechanism

The iris of the lens automatically closes under the following conditions:

- When the built-in color bar signal generator is operating.
- During automatic black balance adjustment.
- When the built-in saw-tooth waveform generator is operating.

Color bar generation

A built-in circuit produces a color bar signal to allow easy color monitor adjustment.

- BVW-400A: an SMPTE type color bar signal (excluding signals I and Q) will be generated.
- BVW-400AP: the EBU standard color bar signal will be generated.

Designed for high image quality

This unit is designed to exploit the high performance CCD to get the very best possible image quality.

- Built-in DCC (Dynamic Contrast Control) circuit allows a wide dynamic range up to six times normal brightness.
- Built-in two-line image enhancer.
- Built-in shading compensation circuit for when the lens extender is used.
- R/G mixing detail circuit gives improved color resolution.
- Built-in saw-tooth waveform generator for adjustment.
- A zebra pattern generator provides a video level display.

Audio functions

- A phantom feed gun-directional microphone is fitted as standard. It can also be detached and used as an interview microphone.
- A microphone other than that supplied can also be connected as an external microphone, and can be attached to the unit using a CAC-12 microphone holder (not supplied).
- The recording level on audio channel 1 can be easily adjusted from the front of the unit.

Recording with an external VTR

When connected to an external VTR such as the BVW-35/35P/25/25P with a CCRZ-5 cable (not supplied), the external VTR can be used for recording a composite video signal instead of the internal VTR.

Simultaneous recording on external and internal VTRs

By fitting a BKW-402 VTR connector unit (not supplied) and connecting an external VTR such as BVW-35/35P/25/25P with a CCZ cable (not supplied), you can record component video signal simultaneously on the external and internal VTRs.

Remote control

If an RM-P3 remote control unit (not supplied) is connected, some of the camera functions can be remotely controlled.

1-1 Principal Features (Continued)

1-1-3 VTR Features

Betacam SP format

Betacam SP format gives improved S/N ratio, frequency bandwidth, waveform characteristics, and detail playback characteristics over the conventional Betacam format, to realize higher video and audio quality.

Metal tape

Using metal tape allows the highest Betacam SP quality to be obtained. In addition to the two audio channels on longitudinal tracks (LNG), by frequency multiplexing you can also record by AFM (Audio Frequency Modulation) on the chrominance track. Oxide tape can also be used, but in that case the recording quality reverts to conventional Betacam standard. The unit automatically determines whether the tape is metal or oxide.

Compatibility with conventional Betacam VTRs

Regardless of tape type, oxide or metal, a cassette tape recorded with this unit can be played back on a conventional Betacam VTR. In that case, however, the special SP characteristics are lost.

Recording review function

The VTR automatically rewinds over the last couple of seconds of recording, and plays them back. This function is convenient for a quick check of the recording.

Playback functions

The playback image is displayed in the viewfinder (black and white). Additionally, using a VA-500/500P playback adaptor (not supplied) a color image can be produced on a color monitor.

Built-in time code generator/reader

LTC (Longitudinal Time Code) and VITC (Vertical Interval Time Code) recording is possible, and also LTC playback. Independently of the time code, the real time can also be saved in the user bits of the VITC.

Time code lock

The built-in time code generator can be locked to an external generator. Since a lithium battery is used as a back-up power supply for the time code generator, the time code can be held for about five years even without charging the unit power supply.

Built-in Dolby¹⁾ noise reduction

The built-in Dolby C-type circuit for longitudinal audio recording gives high S/N ratio and improved wide-band saturation characteristics.

Selectable battery packs


By fitting a DC-500 battery adaptor, you can use a BP-90A/BP-90 battery pack, which lasts longer than the NP-1B/NP-1A. Alternatively, by fitting a DC-520 battery adaptor, you can use two NP-1B/NP-1A battery packs simultaneously. If you attach a special battery mount developed by Anton Bauer Corporation, you can use Anton Bauer Intelligent Battery System and Ultralight System on this unit.

Recording continuity

When the VTR START button, or the VTR button on the lens is pressed, recording continues from exactly the next frame.

Proper recording continuity will also be ensured even when:

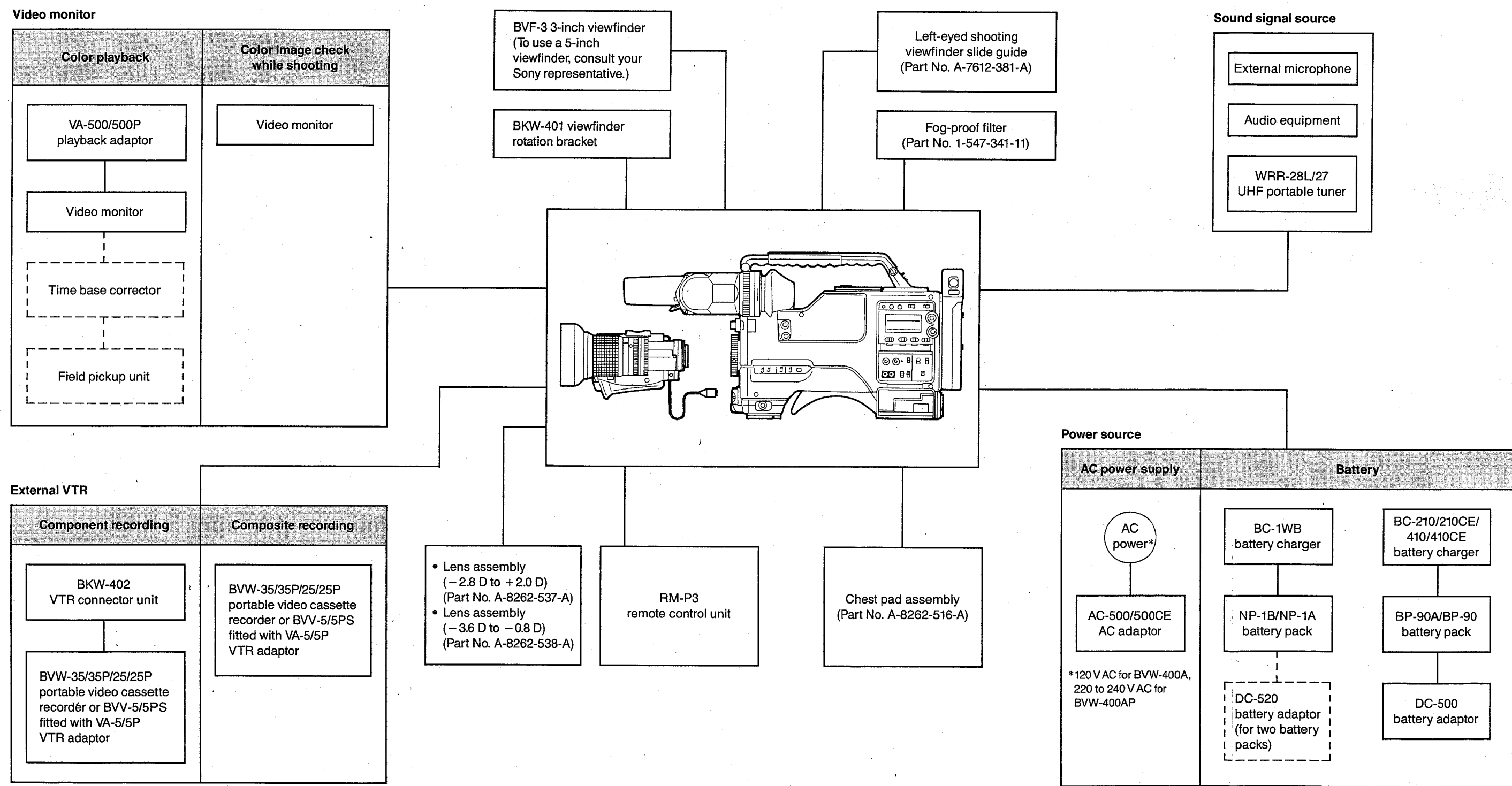
- the VTR is in power saving mode.
- you turn the power off before you restart recording.
- you remove and reinsert the cassette before you restart recording.

1) **Dolby:** Dolby noise reduction manufactured under licence from Dolby Laboratories Licensing Corporation. "DOLBY" and the double-D symbol  are trademarks of Dolby Laboratories Licensing Corporation.

1-2 Example System Configuration

The configuration shown below exemplifies the typical uses of this unit for ENG and EFP.

For further details of the methods of connection of the various ancillary equipment and accessories, read Chapter 3 and following chapters, and the operation manuals for the other equipment.



Chapter 2

Location and Function of Parts and Controls

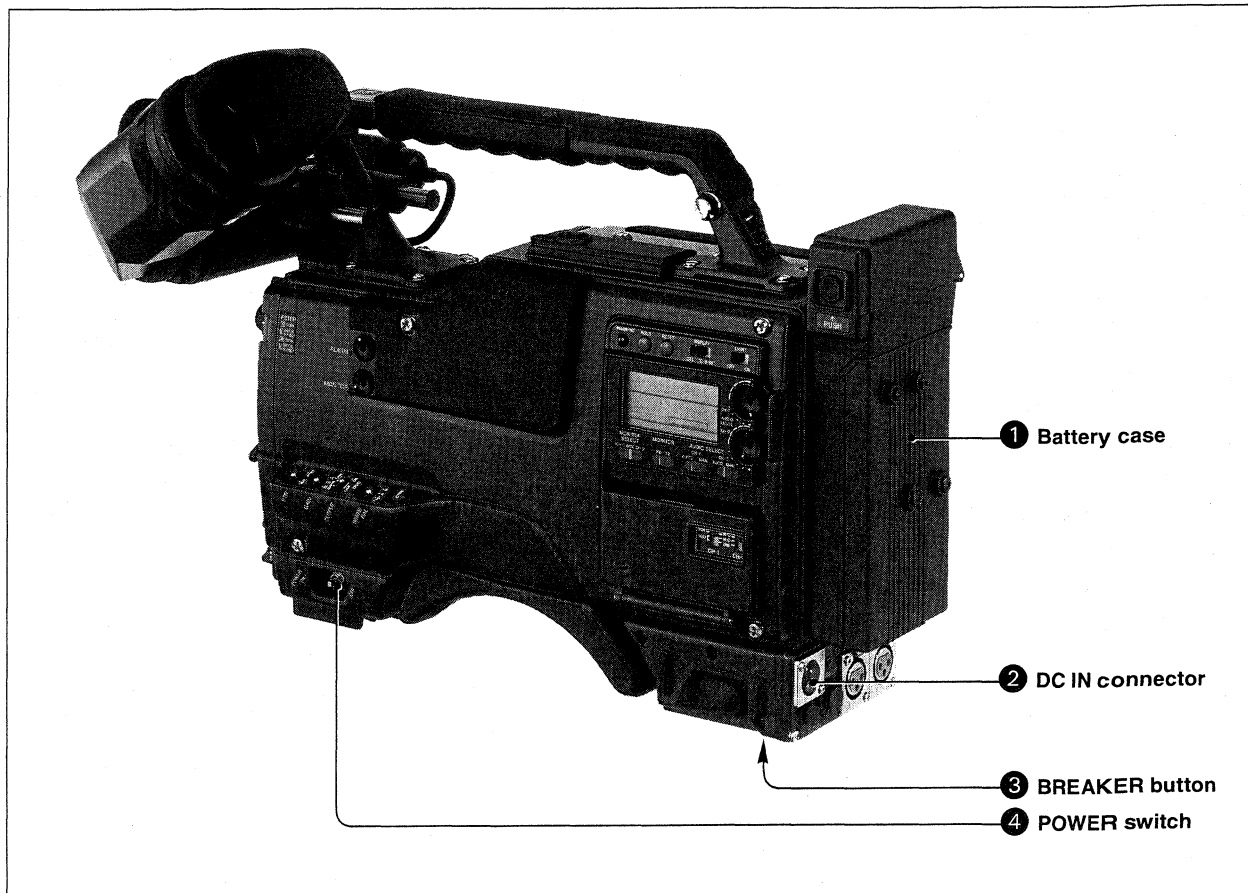
This chapter gives a brief description of the purposes and functions of the principal parts of the unit.

If you are accustomed to using this type of VTR camera unit, reading this chapter should be sufficient to start using it.

If this is the first time you have used this type of camera, read through this chapter, then follow the procedures for setting up and operating the unit in Chapter 3 and the following chapters. You can use this chapter in conjunction with the index to clarify the operation of the various controls.

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2-1 Power Supply



Power supply functions

① Battery case

Insert an NP-1B/NP-1A battery pack (not supplied).

② DC IN (external power input) connector (XLR type, 4-pin, male)

To use the unit with an AC power supply, connect an AC-500/500CE AC adaptor (not supplied), by the DC output cord supplied with the adaptor.

To use an external battery, connect its DC output cord to this connector.

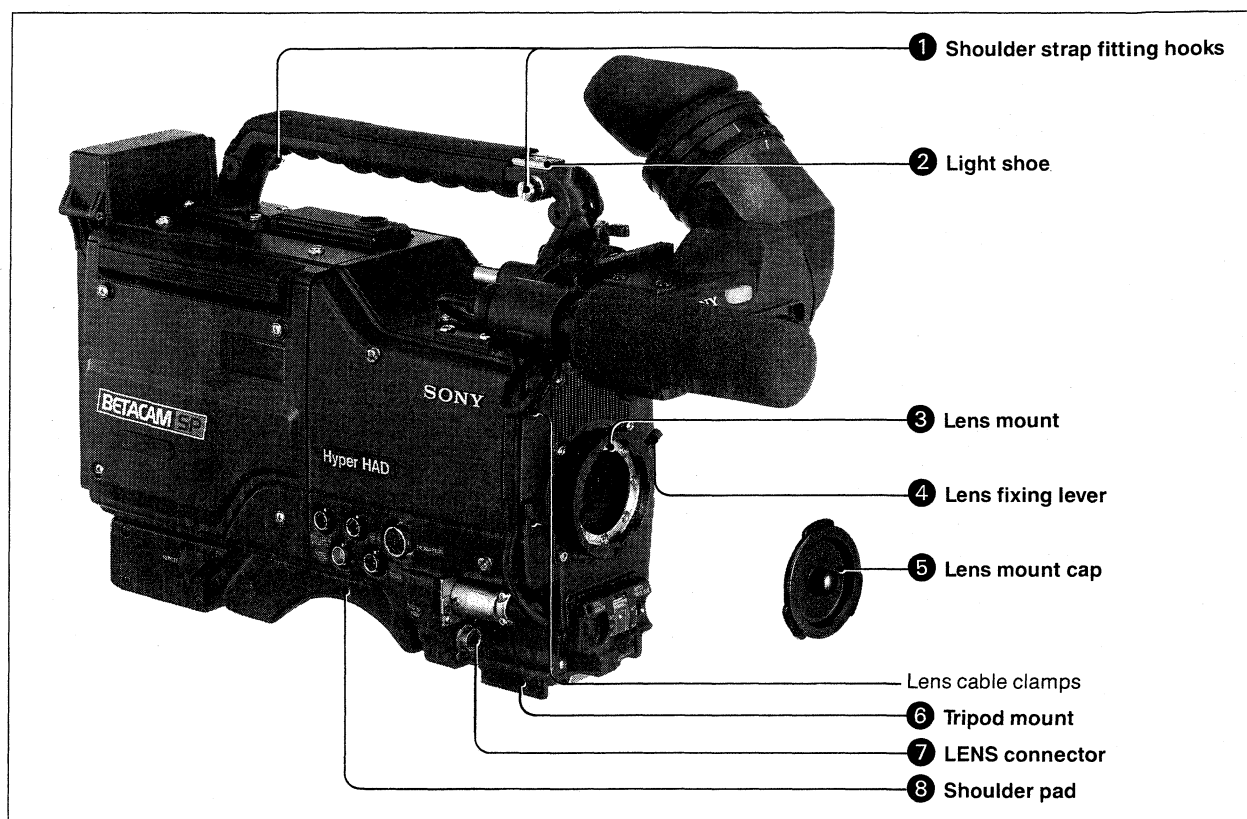
③ BREAKER button

If an excessive current flows in the internal circuitry whatever the cause may be, the internal circuit breaker will trip, and the power is automatically cut off. Check that there is no continuing fault, then press this button in. Normally the power will come on again.

④ POWER switch

This turns the main power supply on and off.

2-2 Accessory Attachments



Accessory attachments

① Shoulder strap fitting hooks

Attach the shoulder strap (supplied) to these hooks.

② Light shoe

For attaching a video light etc.

③ Lens mount

Special bayonet type lens mount.

④ Lens fixing lever

After inserting the lens in the lens mount ③, rotate the lens mount ring with this lever, to fix the lens in position.

⑤ Lens mount cap

Remove by pushing the lens fixing lever ④ up. Always insert this cap for protection from dust when there is no lens mounted.

⑥ Tripod mount

Fit the tripod adaptor supplied in order to use the unit on a tripod.

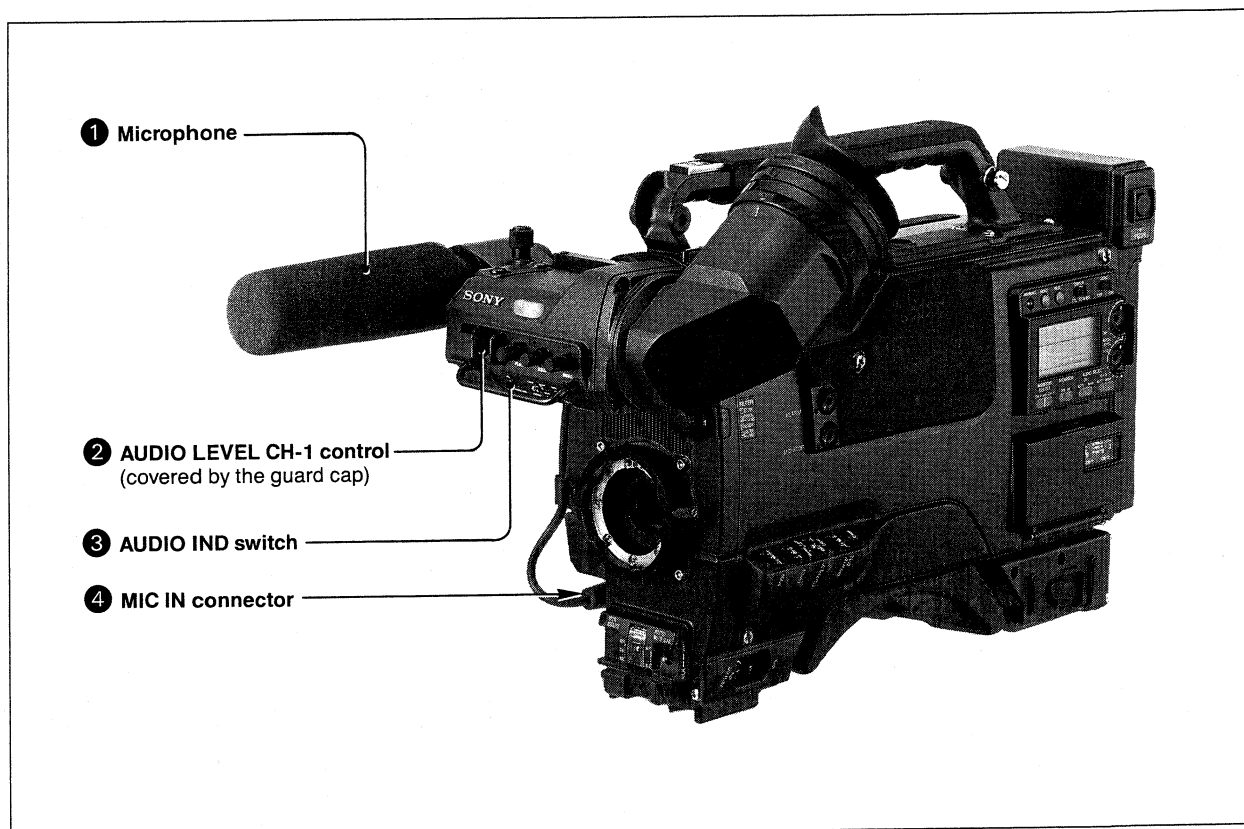
⑦ LENS connector (12-pin)

Fit the lens cable to this connector. Contact your Sony representative for more details about the lens you are using.

⑧ Shoulder pad

You can adjust the position front to rear of the shoulder pad by loosening the two screws. Do this to ensure the best balance when shooting with the camera on your shoulder.

2-3 Audio Functions



Audio functions (1)

① Microphone

The microphone is a phantom power supply, gun-directional type. You can detach it from the unit for use as an interview microphone.

② AUDIO LEVEL CH-1 (audio channel-1 recording level) control

When the AUDIO SELECT CH-1 switch ⑥ is set to MAN, this control adjusts the recording level of audio channel 1. If the AUDIO IND switch ③ is set to ON, you can watch the audio level display in the viewfinder while making level adjustments. You can use this control in conjunction with the AUDIO LEVEL CH-1 control ⑤ on the side panel.

After you have adjusted the audio channel-1 recording level, it is recommended to close the misoperation guard cap for this control.

③ AUDIO IND (audio channel-1 recording level indicator) switch

This on/off switch determines whether the channel-1 audio recording level is displayed on the viewfinder screen. When recording it also determines whether the amount of tape remaining is displayed.

④ MIC IN (microphone input) connector (XLR type, 3-pin, female)

The microphone supplied connects to this connector. You can connect a microphone other than that supplied as long as it is a phantom power supply type. The connector supplies power (+48 V) to the microphone.

2-3 Audio Functions (Continued)



Audio functions (2)

5 AUDIO LEVEL CH-1/CH-2 (audio channel-1 and channel-2 recording level) controls

These controls adjust the audio level of channels 1 and 2 when you set the AUDIO SELECT CH-1/CH-2 switches 6 to MAN.

You can use the CH-1 control in conjunction with the AUDIO LEVEL CH-1 control 2 at the viewfinder front.

6 AUDIO SELECT CH-1/CH-2 switches

These switches set the audio level adjustment for channels 1 and 2 to manual (MAN) or automatic (AUTO).

7 AUDIO IN (input) switches

These switches select the audio input signal for audio channels 1 and 2. The input signal source is as follows:

FRONT [MIC]: The microphone connected to the MIC IN connector 4.

REAR [MIC]: The microphone connected to the AUDIO IN connector 9.

REAR [LINE]: The line input signal connected to the AUDIO IN connector 9.

8 DOLBY NR (Dolby noise reduction) switch

When oxide tape is used, this switch controls whether to use the Dolby noise reduction system for record/playback. When using metal tape, the Dolby noise reduction system is always on, regardless of the setting of this switch.

9 AUDIO IN (input) CH-1/CH-2 connectors (XLR type, 3-pin, female)

These are the audio input connectors for channels 1 and 2, to which you can connect a microphone or other audio device.

10 Phantom power (+ 48 V) switches

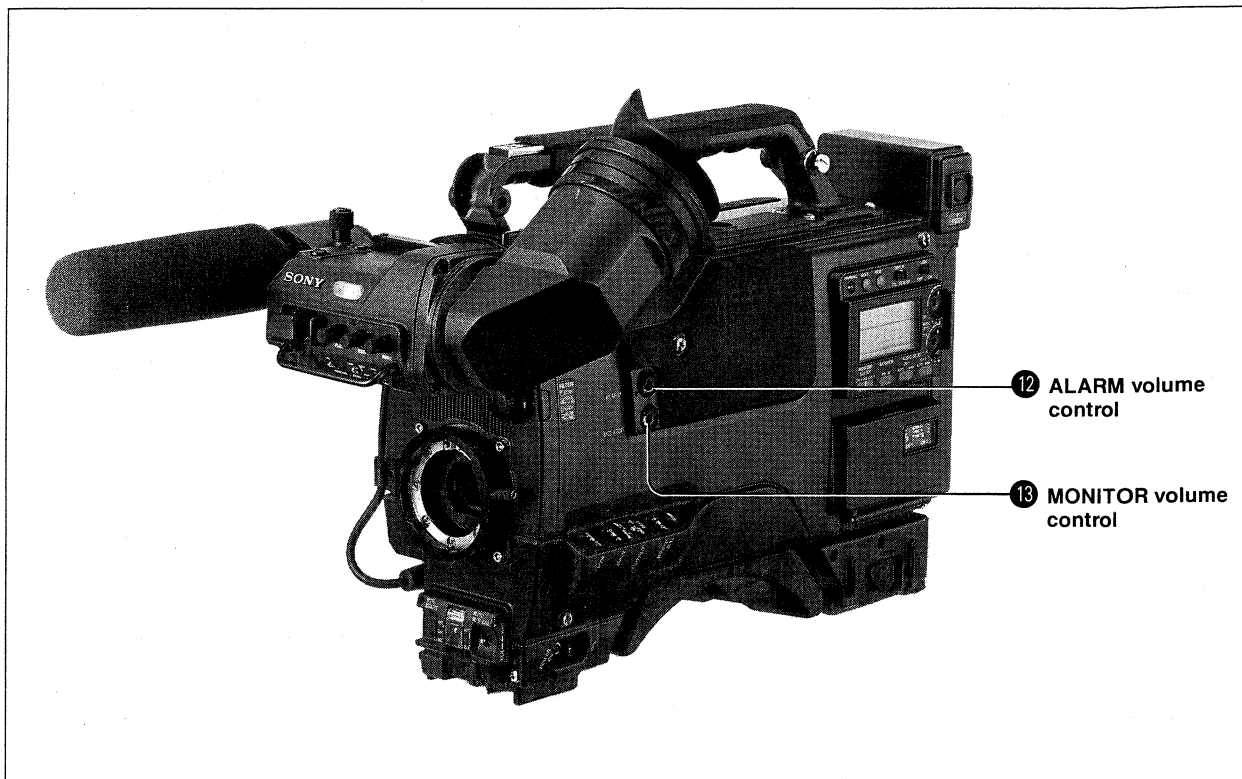
ON: When connecting a phantom feed type microphone to the corresponding AUDIO IN connector 9, choose this position.

OFF: When connecting a different type microphone to the corresponding AUDIO IN connector, choose this position.

11 DC OUT (DC power output) connector

Supplies power for a WRR-28L UHF portable tuner (not supplied). Do not connect anything other than a UHF portable tuner to this connector.

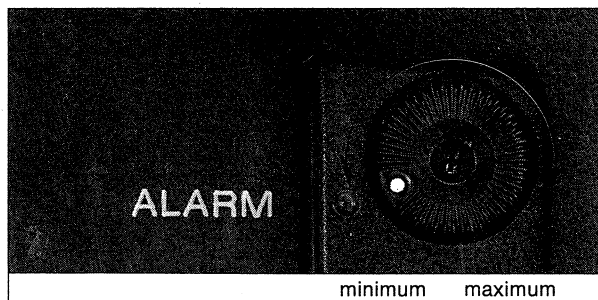
2-3 Audio Functions (Continued)



Audio functions (3)

12 ALARM volume control

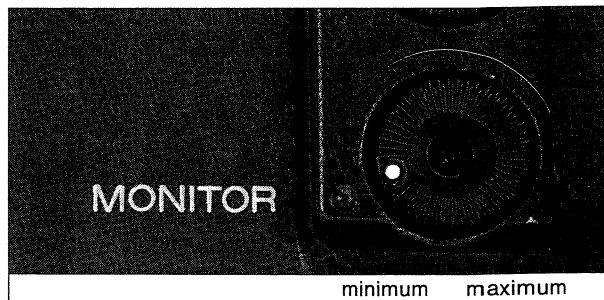
This control adjusts the volume of warning sounds from the speaker 14 or earphone connected to the EARPHONE jack 17. At the minimum position the alarm cannot be heard at all.



ALARM volume control

13 MONITOR volume control

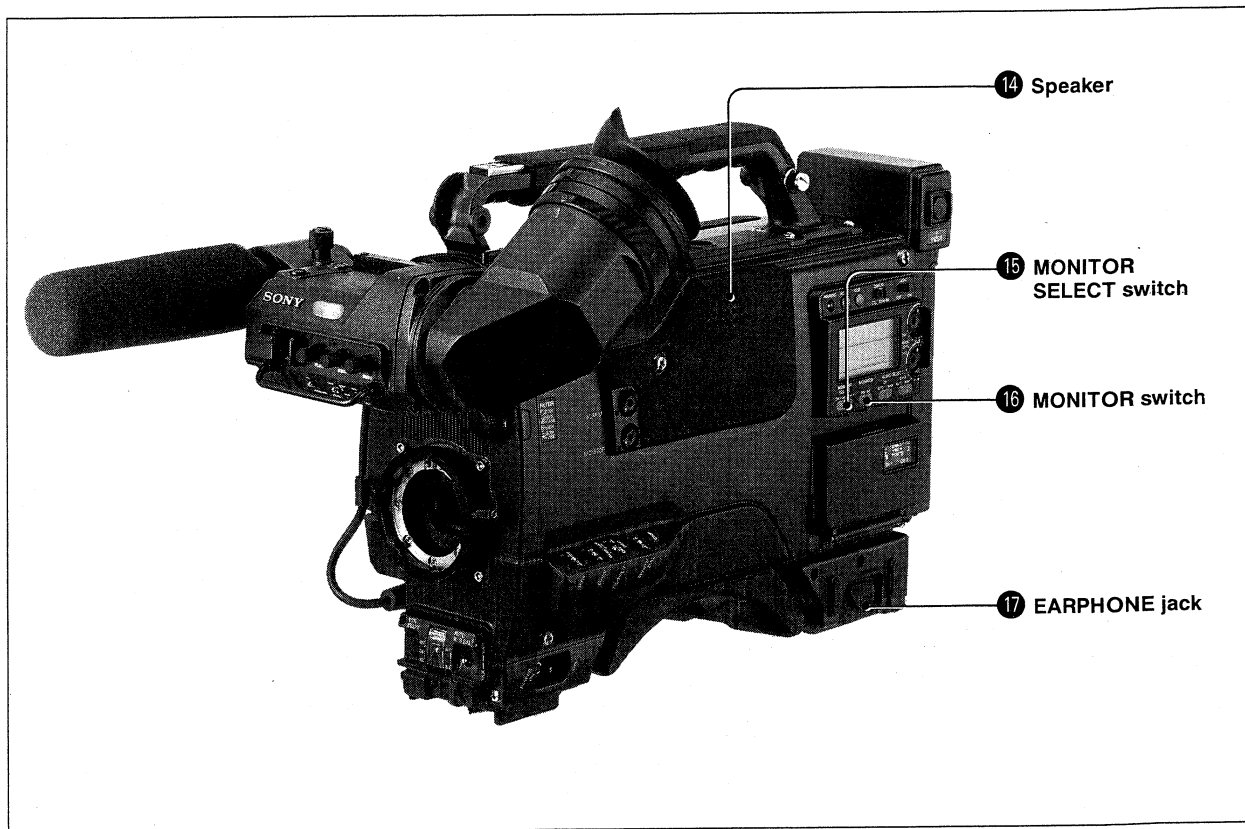
This control adjusts the volume of sound from the speaker 14 or earphone excluding warning sounds. At the minimum position the sound cannot be heard at all.



MONITOR volume control

You can adjust the internal volume control so that the alarm is audible even at the minimum setting of this ALARM volume control.

Refer to the maintenance manual for details.



Audio function (4)

14 Speaker

When recording the speaker can be used for monitoring either E-E sound¹⁾ or simultaneous playback sound, and during playback for monitoring one or both audio channels. The speaker also produces warning sounds to reinforce visual warnings.

If an earphone is plugged into the EARPHONE jack 17, the sound from the speaker is automatically cut off.

See "Operation Warnings" (page A-3) for further details.

15 MONITOR SELECT switch

This switch selects the audio output to the speaker 14 or earphone.

CH-1: Audio channel 1

MIX: Mixed sound of channels 1 and 2

CH-2: Audio channel 2

16 MONITOR switch

When recording, this switch controls the type of audio signal output to the speaker 14 or earphone.

PB: Simultaneous playback sound

EE: E-E sound¹⁾

17 EARPHONE jack (mini-jack)

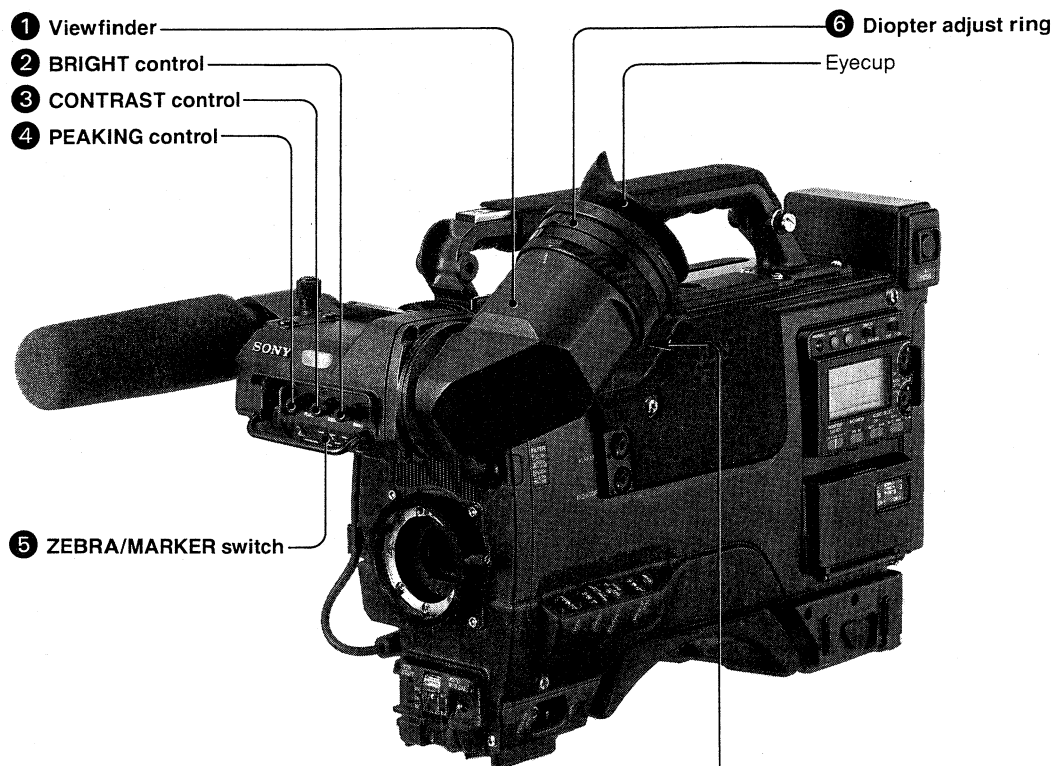
Plugging an earphone into the jack cuts off the speaker 14, and the sound is heard only through the earphone.

1) E-E sound (Electric to Electric sound)

This term refers to an audio signal which has passed through the amplifier, but has not been recorded on the tape. In other words, you can

directly monitor the recording input signal, as opposed to the simultaneous playback (output) signal.

2-4 Shooting and Record/Playback Functions



-
- Diagram showing the viewfinder controls:
- ⑦ Viewfinder left-right positioning ring
 - ⑧ Viewfinder front-rear positioning lever
 - ⑨ Viewfinder stopper

Shooting and record/playback functions (1)

1 Viewfinder

Enables you to view the camera image while shooting, and the playback picture from the VTR in black and white. Also provides various warnings and other information, a zebra pattern¹⁾, safety zone marker²⁾ and center marker³⁾.

2 BRIGHT (brightness) control

Adjusts the picture brightness on the viewfinder screen. Has no effect on the camera output signal.

3 CONTRAST control

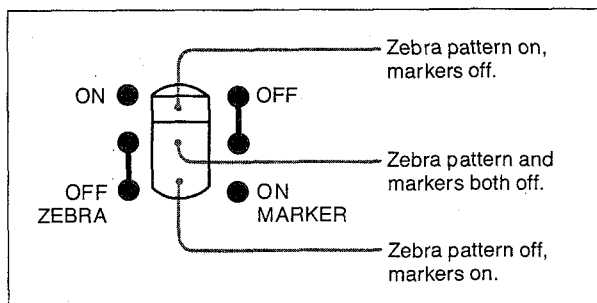
Adjusts the picture contrast on the viewfinder screen. Has no effect on the camera output signal.

4 PEAKING control

Adjusts the sharpness of the picture on the viewfinder screen to make focusing easier. Has no effect on the camera output signal.

5 ZEBRA/MARKER (zebra pattern/markers) switch

Controls the display of the zebra pattern and markers on the viewfinder screen. The settings are as follows:



ZEBRA/MARKER switch settings

Note

Unless the safety zone marker and center marker are turned on by the internal switches (SAFETY ZONE ON/OFF, CENTER MARKER ON/OFF), they will not be displayed whatever the setting of this switch. When the unit is shipped, these internal switches are all set to ON.

See Section 3-11 "Internal Switch Settings for Marker Display and 26-pin Interface Control" (page 3-34) for more details.

6 Diopter adjust ring

Use this to adjust the viewfinder image for your eyesight.

7 Viewfinder left-right positioning ring

Loosen this ring to adjust the position of the viewfinder 1 to right or left.

8 Viewfinder front-rear positioning lever

Loosen this lever to adjust the position of the viewfinder 1 to the front or rear.

9 Viewfinder stopper

Pull down the stopper to detach the viewfinder 1 from the camera.

1) Zebra pattern

The zebra pattern aids manual iris adjustment, by indicating areas of the picture where the video level is approximately 70% (for the BVW-400A) or 490 mV (for the BVW-400AP).

2) Safety zone marker

The safety zone marker is a box indicating the effective picture area equivalent to 80% or 90%

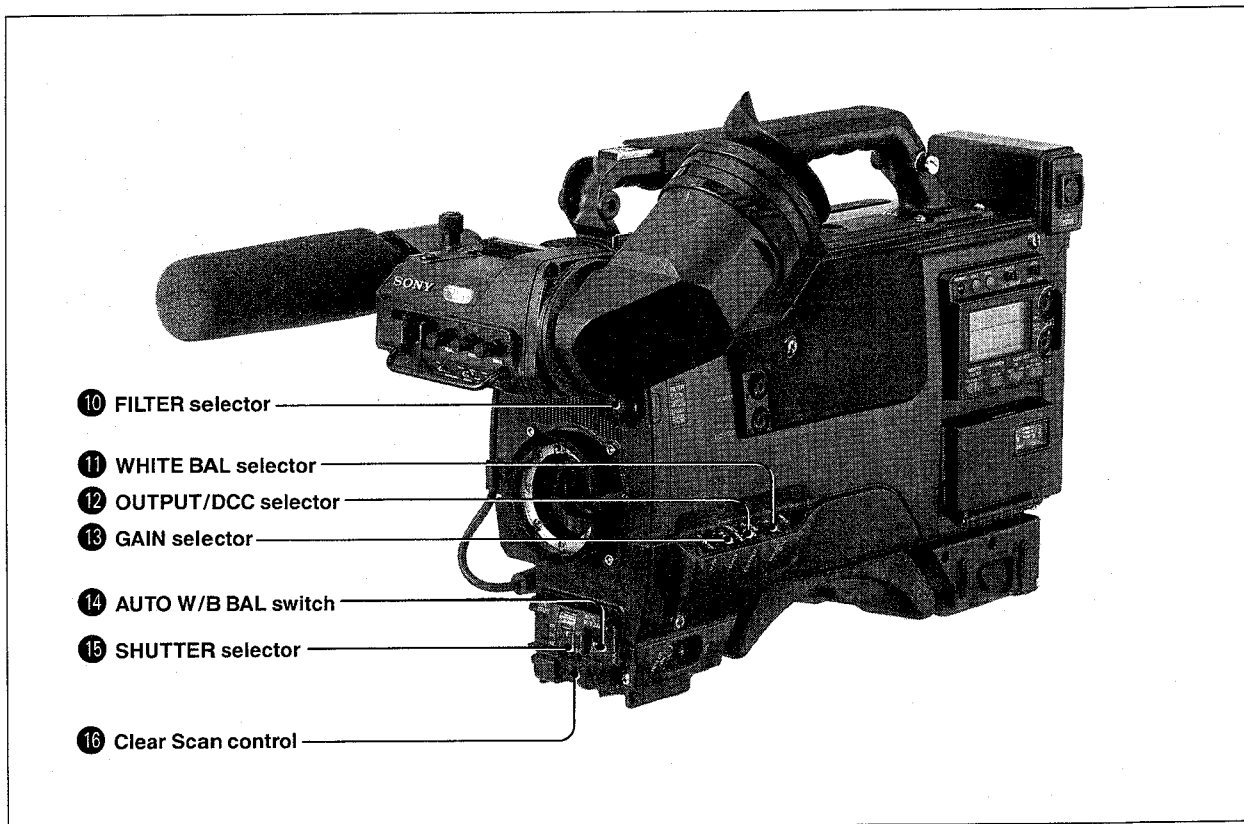
(the factory setting) of the whole viewfinder screen area. You can change the effective picture area from 90% to 80% by using an internal switch.

For details, see Section 3-11 "Internal Switch Settings for Marker Display and 26-pin Interface Control" (page 3-34).

3) Center marker

The center marker indicates the center of the picture with a cross.

2-4 Shooting and Record/Playback Functions (Continued)



Shooting and record/playback functions (2)

10 FILTER (optical filter) selector

Selects the appropriate internal filter for the color temperature and brightness of the shooting illumination.

FILTER selector settings

Selector position	Internal filter color temperature + ND (neutral density)	Shooting conditions
1	3200 K	Sunrise and sunset; studio
2	5600 K + 1/4 ND	Outdoors, clear skies
3	5600 K	Outdoors, cloud or rain
4	5600 K + 1/16 ND	Very bright conditions: snow, high altitudes, or seaside

11 WHITE BAL (balance memory) selector

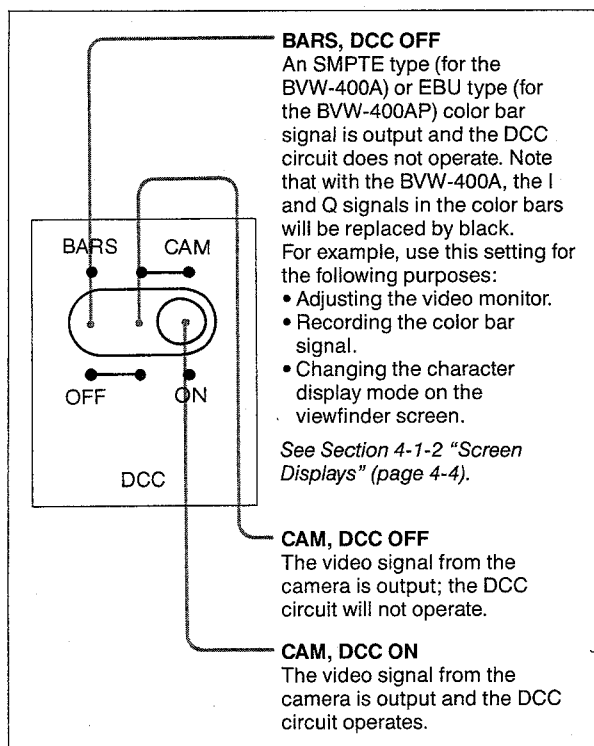
Determines the source of white balance settings.

PRST (preset): provides a factory-preset white balance value for color temperature of 3200 K when you choose the FILTER selector position 1, or for 5600 K when choosing any other FILTER selector position. Use this PRST setting when there is no time for white balance adjusting operation.

A or B: selects memory A or B. The white balance setting used will be that stored with the AUTO W/B BAL switch 14, for the current FILTER selector position.

12 OUTPUT/DCC (output signal/Dynamic Contrast Control) selector

Switches the video signal output to the VTR, viewfinder and video monitor, between the color bar signal and the camera output; also switches DCC¹⁾ on and off when camera output is selected.



OUTPUT/DCC switch settings

13 GAIN selector

When the light is poor and the picture is dark, use this selector to increase the gain of the video amplifier, and brighten the picture.

0: normal setting

9: increase gain by 9 dB

18: increase gain by 18 dB

The gain at the 18 dB setting can be further increased to 24 dB by changing the internal switch settings.

Refer to the maintenance manual for details.

14 AUTO W/B BAL (automatic white/black balance adjustment) switch

WHT: pushing the switch to WHT has three functions:

- Automatic adjustment of the white balance. If the WHITE BAL selector 11 is set to A or B, the white balance setting is stored in the corresponding memory.
- Selecting the viewfinder character display mode. This function is available only when you set the OUTPUT/DCC selector 12 to BARS, DCC OFF to output the color bar signal.

See Section 4-1-2 "Screen Displays" (page 4-4) for details.

- Stepping through the camera self-diagnosis test.

Refer to the maintenance manual for details.

BLK: Automatic adjustment of black set and black balance. The setting is stored in a separate memory.

15 SHUTTER (electronic shutter) selector

Move this selector from OFF to ON to activate the electronic shutter. Pushing the selector further down to the SEL position changes the shutter speed/operation mode, which appears on the viewfinder screen.

See Section 5-2 "Setting the Electronic Shutter" (page 5-10) for details.

16 Clear Scan control

After selecting the Clear Scan (CLS) or Extended Clear Scan (ECS) mode with the SHUTTER selector 15, rotate this control to change the CLS or ECS shutter speed.

For details see Section 5-2 "Setting the Electronic Shutter" (page 5-10).

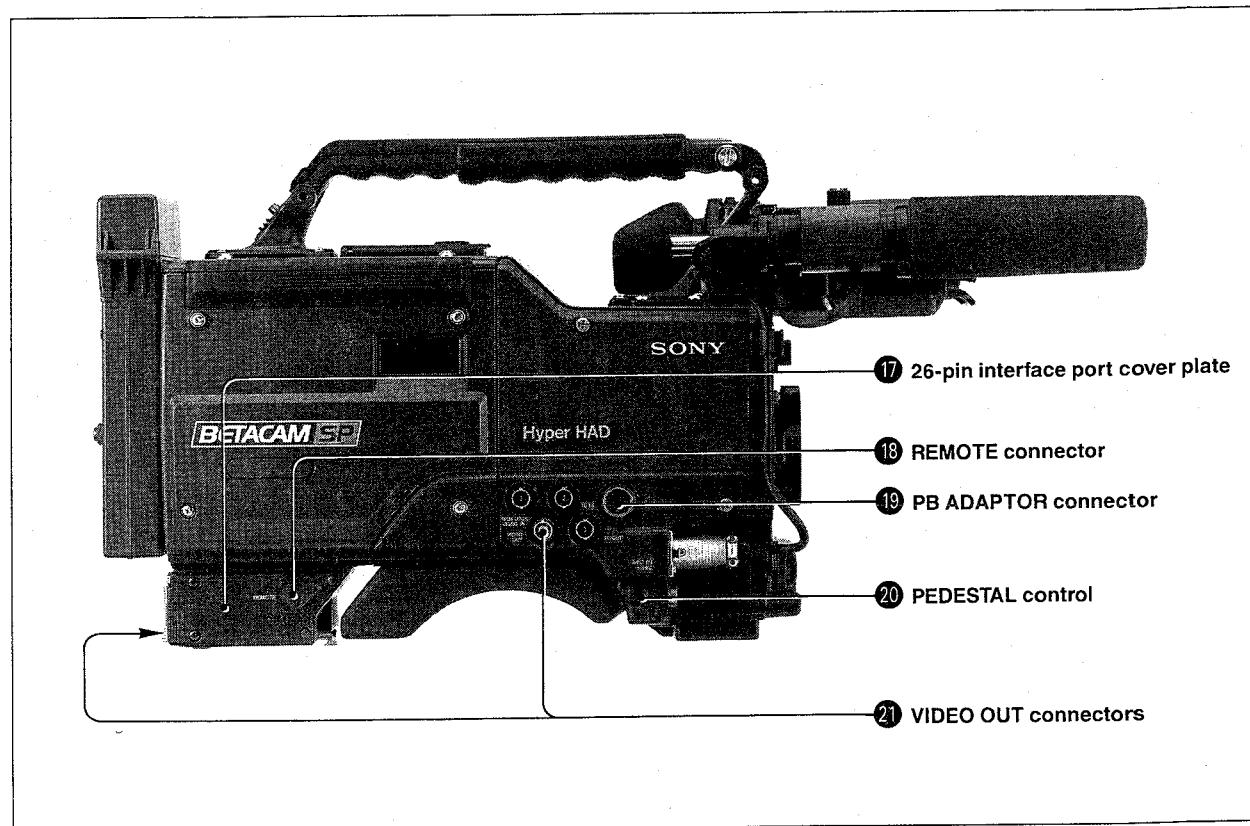
1) DCC (Dynamic Contrast Control)

When shooting against a very bright background with the iris opening adjusted to the subject, objects in the background will be lost in the glare. In such cases the DCC function will restore much of the lost detail. It is particularly effective in the

following cases.

- Shooting people against a bright sky.
- Shooting a subject indoors, against a background through a window.
- Any high contrast scenes.

2-4 Shooting and Record/Playback Functions (Continued)



Shooting and playback/record functions (3)

17 26-pin interface port cover plate

To equip the unit with a BKW-402 VTR connector unit (not supplied), remove this plate and install the 26-pin connector of the BKW-402 here. By connecting an external VTR such as the BVW-35/35P/25/25P portable cassette recorder to the 26-pin connector, you can simultaneously record on it and the internal VTR.

18 REMOTE (remote control) connector (6-pin)

Connect the RM-P3 remote control unit (not supplied) to this connector.

19 PB ADAPTOR (playback adaptor) connector (20-pin)

This connector is for connecting a television or color monitor by means of the VA-500/500P playback adaptor (not supplied); you can then see the playback picture in color.

Additionally, by connecting a portable VTR such as a BVW-35/35P/25/25P with a CCRZ-5 cable (not supplied) you can record on the external VTR instead of the internal VTR.

20 PEDESTAL control

Adjusts the master pedestal level.

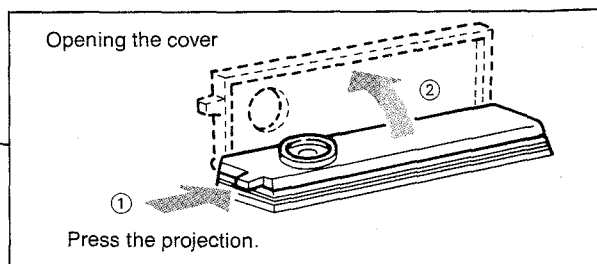
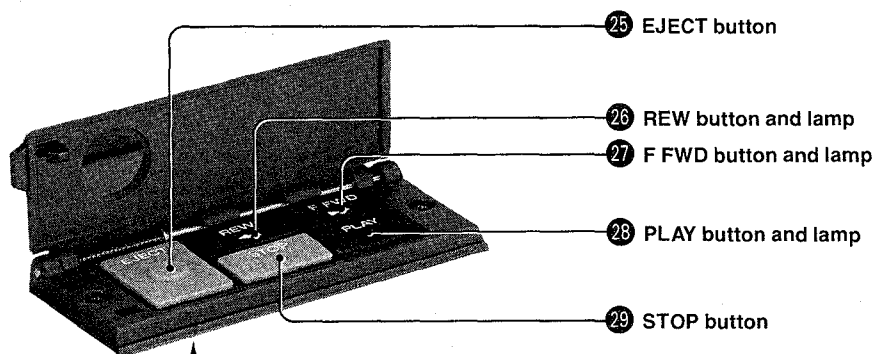
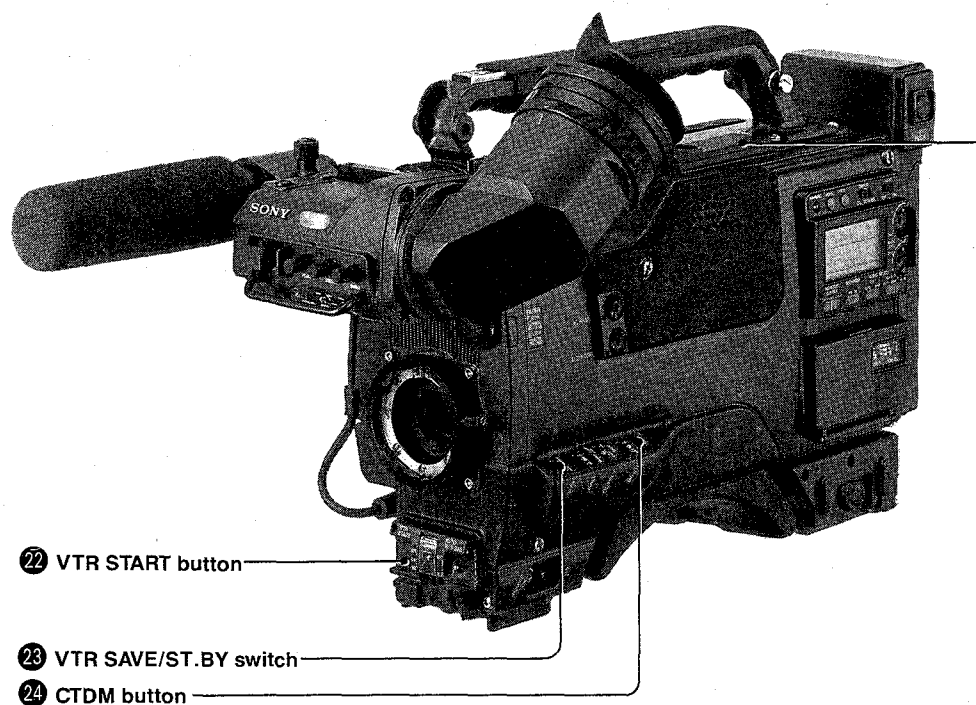
21 VIDEO OUT (output) connectors (BNC type)

- To check the picture the camera is shooting, connect a video monitor. In recording mode (REC, REC PAUSE, REC REVIEW or STOP modes) the picture from the camera is output, but in playback mode (PLAY, F FWD, REW modes) no picture is output.
- To lock the time code of another BVW-400A/400AP unit to that of this unit, connect to the GENLOCK VIDEO IN connector of that unit.
- Both of the VIDEO OUT connectors, on the rear and the side, can supply a satisfactory level of signal at terminating impedance of 75 ohms.

Note

The side connector can supply independently a satisfactory level of signal at terminating impedance of 75 ohms. However, the rear connector is connected internally to the PB ADAPTOR connector (20-pin) 19 and the 26-pin interface, so it is not possible to get a satisfactory signal at 75-ohm terminating impedance simultaneously from more than one of the rear VIDEO OUT connector, the PB ADAPTOR connector and the 26-pin interface.

2-4 Shooting and Record/Playback Functions (Continued)



Shooting and record/playback functions (4)

22 VTR START button

Press this button to start recording, and press again to stop. The effect is exactly the same as that of the VTR button on the lens.

23 VTR SAVE/ST.BY switch

Controls the VTR powering mode during a recording pause (REC PAUSE).

SAVE: power saving mode. When you press the VTR START button 22, there is a delay before recording starts, but the power consumption is reduced compared with stand-by mode, prolonging battery life.

ST.BY: stand-by mode. Recording will restart immediately.

You can check the setting of this switch while looking into the viewfinder: if the switch is set to SAVE, the VTR SAVE lamp below the viewfinder screen lights.

See Section 4-1 "Warnings and Indications in the viewfinder" (page 4-3).

24 CTDM (Compressed Time Division Multiplex playback) button

Pressing this button during playback or recording review changes the playback picture on the viewfinder screen to a time division chroma signal, so you can check a chrominance track.

25 EJECT (cassette eject) button

Press to eject cassette, and also when loading a cassette.

26 REW (rewind) button and lamp

Press to rewind the tape. The lamp is on while rewinding.

27 F FWD (fast forward) button and lamp

Press to fast forward the tape. The lamp is on during fast forward.

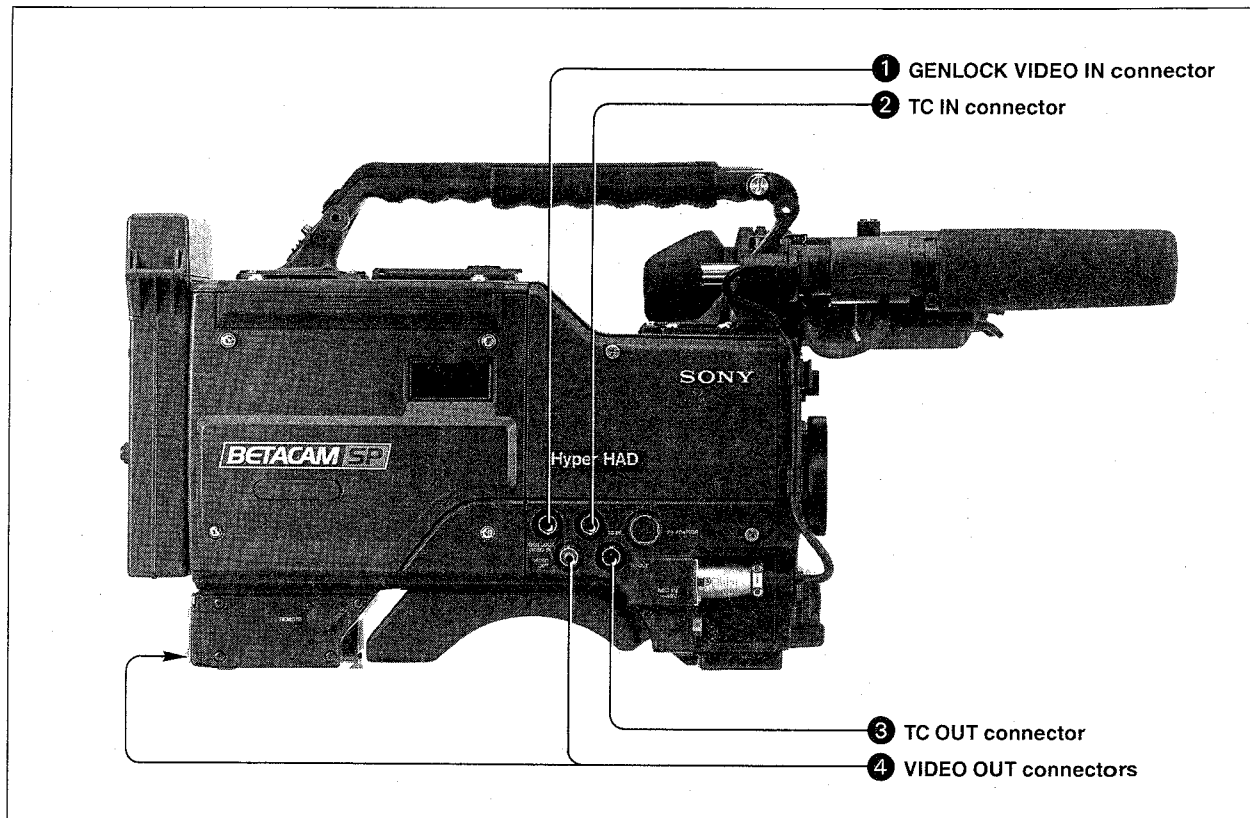
28 PLAY (playback) button and lamp

Press to view the recorded picture in the viewfinder or on a video monitor connected via a VA-500/500P playback adaptor. The lamp is on during playback.

29 STOP button

Press to stop the tape.

2-5 Time Code System



Time code functions (1)

① GENLOCK VIDEO IN (video input for genlock) connector (BNC type)

To supply a genlock signal to the unit, or to lock the time code to an external time code, connect the reference video signal input.

② TC IN (time code input) connector (BNC type)

To lock the time code to an external time code, connect the reference time code input.

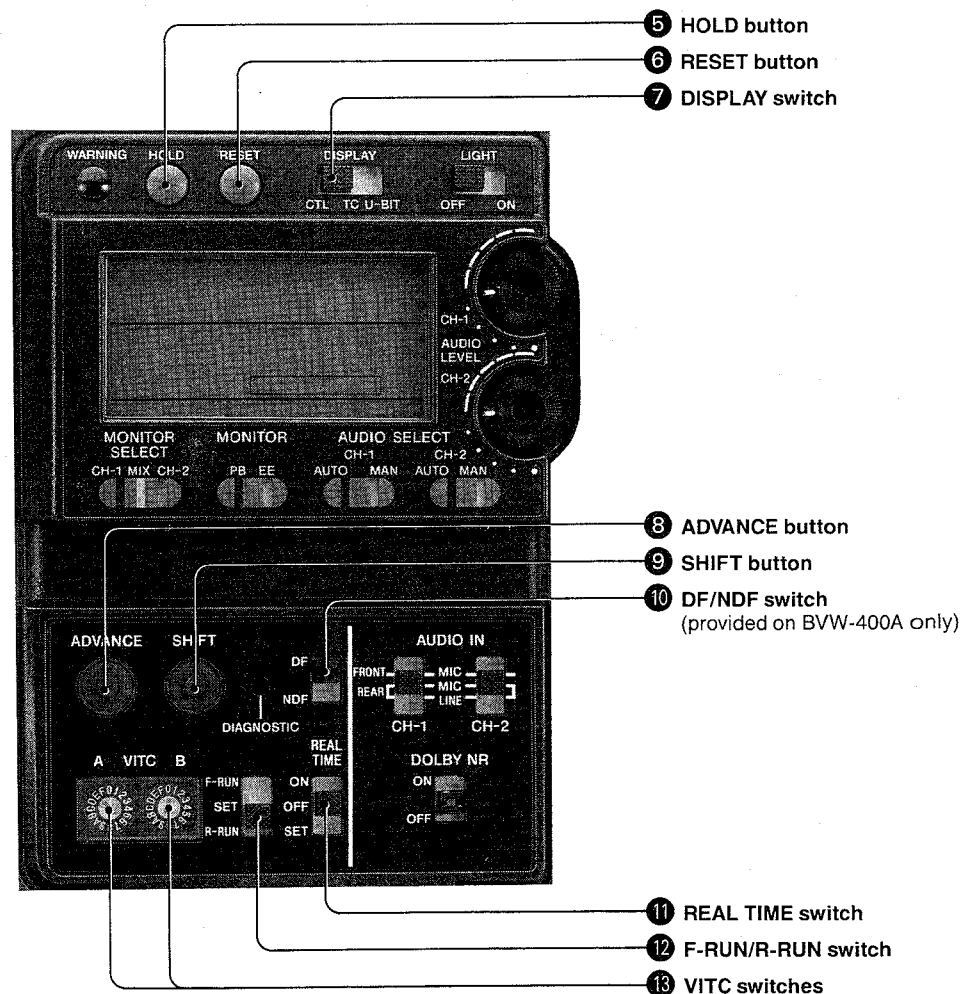
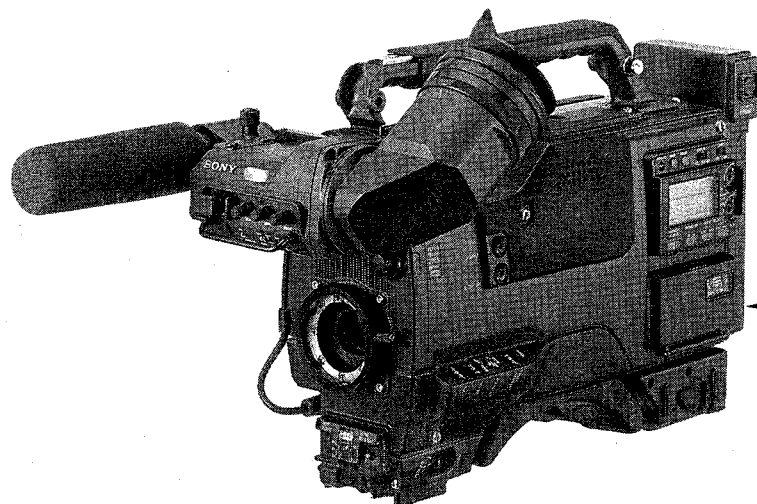
③ TC OUT (time code output) connector (BNC type)

To lock the time code of an external VTR to that of this unit, connect this connector to the TC IN lock connector of the external VTR.

④ VIDEO OUT connectors (BNC type)

- When locking the time code of another BVW-400A/400AP unit, connect to the GENLOCK VIDEO IN connector of that unit.
- To check the picture the camera is shooting, connect to a video monitor.

2-5 Time Code System (Continued)



Time code functions (2)

⑤ HOLD (display hold) button

At the instant this button is pressed, it freezes the time data displayed in the counter display section. (The time code generator continues running normally.) Press again to release the hold. Use this feature to determine the exact time of a particular shot for example.

See Section 4-2 "Warnings and Indications in the Display Panel" (page 4-7) for more details of the counter display.

⑥ RESET (counter reset) button

Resets the time data displayed on the counter display section to "00:00:00:00", and the user bit data to "00000000".

⑦ DISPLAY switch

Depending on the settings of the REAL TIME switch ⑪ and the F-RUN/R-RUN switch ⑫, selects data to display in the counter display section, as follows:

U-BIT: displays user bits.

TC: displays time code.

CTL: displays CTL.

For more details see "Time code displays" (page 4-8).

⑧ ADVANCE button

When setting the time code or user bits, each press of this button increments the flashing digit selected by the SHIFT button ⑨.

⑨ SHIFT button

When setting the time code or user bits, this button selects the digit to change. The digit selected flashes.

⑩ DF/NDF (drop frame/non-drop frame) switch (BVW-400A only)

Selects whether the time code advances in drop frame mode (DF) or non-drop frame mode (NDF).

⑪ REAL TIME (time of the day) switch

Use this switch to select whether real time is put into VITC¹⁾ user bits (ON or OFF), or to set real time (SET).

⑫ F-RUN/R-RUN (free run/recording run) switch

Selects the operating mode of the internal time code generator.

F-RUN: The time code advances irrespective of whether the VTR is operating or not. Use for setting the real-time time code or for locking the time code to an external time code.

SET: Set to this position to set the time code or user bits.

R-RUN: The time code advances only while recording, and therefore the time code is continuous on the tape.

For more details see Section 5-4-1 "Setting the Time Code" (page 5-17) and Section 5-4-2 "Setting User Bits" (page 5-19).

⑬ VITC¹⁾ (VITC line select) switches

Select the lines on which VITC is inserted.

For more details see "Selecting the lines to insert the VITC" (page 5-18).

1) VITC (Vertical Interval Time Code)

A time code which is recorded on tape in two horizontal lines during each vertical blanking interval of the video signal. It can be read out and displayed even when you play back the tape at very low speed or in the pause mode.

Chapter 3

Setting Up the Unit

This chapter first presents important precautions to ensure proper operation of the unit, and then describes the essential procedures for providing a power supply and mounting a lens. It also explains the functions and operation of the various accessories, both those supplied with the unit and optional extras, which you may wish to use. Finally it describes the possibilities for using the unit in conjunction with an external VTR.

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3-1 Important Precautions

3-1-1 Use and Storage

Do not subject the unit to severe shocks

The internal mechanism may be damaged, or the body distorted.

After use

Turn the power switch off.

When not used for a period of time

Remove the battery pack.

Use and storage locations

Store in a level, ventilated place. Avoid using or storing the unit in the following places:

- Where it is subject to extremes of temperature.
- Very damp places.
- Places subject to severe vibration.
- Near strong magnetic fields.
- In direct sunlight for extended periods, or close to heating apparatus.

3-1-2 Condensation

If you move the unit suddenly from a very cold place to a warm place, or use it in a very damp location, condensation may form on the head drum. If the unit is operated in this state, the tape may adhere to the drum, and cause a failure or even permanent damage. Take the following steps to prevent this from happening:

- When moving the unit from a cold place to a warm place, do not load a cassette, or unload the cassette if loaded.
- When you have turned the power on, check that the HUMID indicator is not showing. If it is showing, do not insert a cassette until it has gone off.

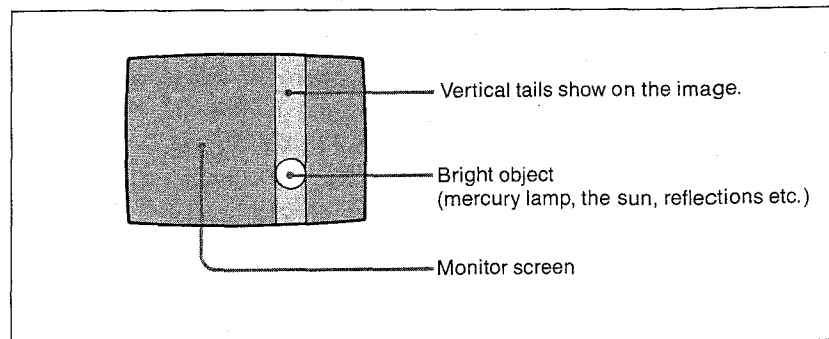
For more details see Section 6-1-1 "Loading and Unloading Cassettes" (page 6-3) and "Operation Warnings" (page A-3).

3-1 Important Precautions (Continued)

3-1-3 Notes on CCD Image Sensors

Vertical Smear

Smear tends to be produced when an extremely bright object is being shot, and is more likely to occur with a faster electronic shutter speed.



Vertical smear

Aliasing

When patterns of stripes or lines are shot, they may appear jagged.

3-2 Power Supply

For the power supply to this unit, use an NP-1B/NP-1A or BP-90A/BP-90 Sony battery pack, or an AC power supply. Alternatively, you can use an “external battery”, which can be a BP-90A/BP-90 contained in a DC-210 battery adaptor and connected to the DC IN connector of this unit. Furthermore, you can make combined use of internal and external batteries.

3-2-1 Using an NP-1B/NP-1A Battery Pack

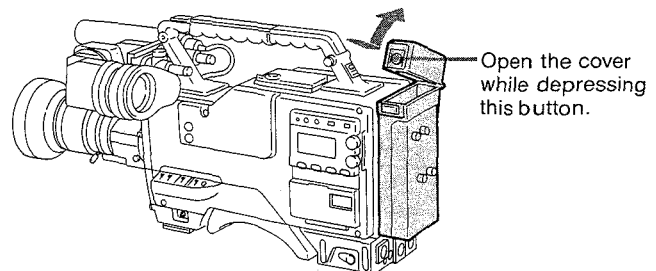
The unit will operate for about 60 minutes using an NP-1B battery pack.

Before use, charge the battery pack with a BC-1WB battery charger, for about one hour.

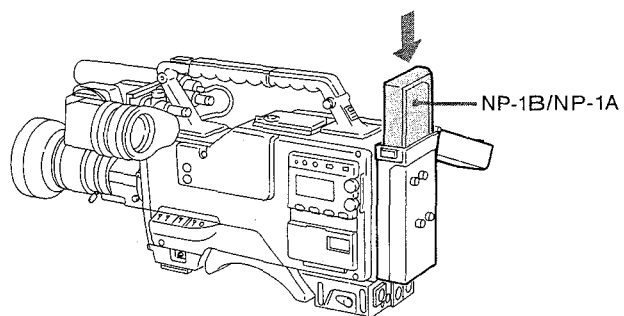
For more details, refer to the manual for the BC-1WB.

Loading the battery pack

- 1 Open the cover of the battery case.



- 2 Slide the battery into the battery case, with the arrow on the battery pack pointing downward.

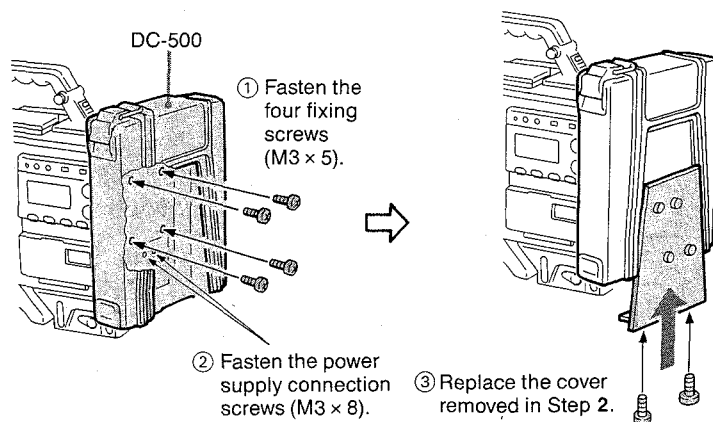


Notes on using the battery pack

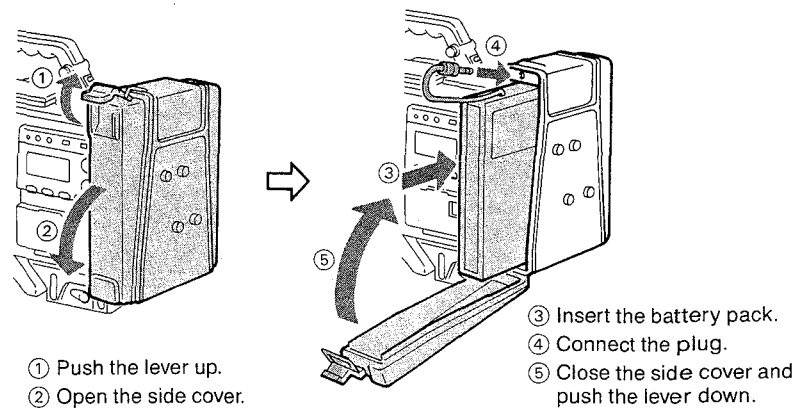
- When the battery pack is loaded, regardless of the setting of the POWER switch of this unit, the time code circuit is always activated, so it consumes some power. Always remove the battery pack if you do not intend to use the unit for some time.
- If you try to recharge the battery pack while still warm, you may not charge it fully.

3-2 Power Supply (Continued)

3 Fit the DC-500.



4 Fit the BP-90A/BP-90 battery pack in the adaptor.



3-2-3 Avoiding Breaks in Operation Due to Exhausted Batteries

If you use an internal battery pack and an external battery connected to the DC IN connector at the same time, then when the external battery is exhausted and needs replacing, you can maintain continuous operation using the internal battery pack. Again, if the internal battery is close to needing replacement, you can connect an external battery to allow continuous operation while you replace the internal battery pack.

When the external battery is getting exhausted with the unit also fitted with an internal battery pack

First remove the DC output cord of the external battery from the DC IN connector. The power supply will switch to the internal battery pack. Then since the voltage of the internal battery pack will already have dropped somewhat, connect a fully charged external battery as soon as possible. The maximum operation time is about 10 minutes for this unit.

When you change both batteries, be sure to first replace the external one which is getting exhausted. If you remove the internal battery first, the unit may stop immediately.

When the external battery is getting exhausted with the unit not fitted with an internal battery pack

First load a fully charged internal battery pack, then remove the DC output cord of the external battery from the DC IN connector. The power supply will switch to the internal battery pack. To use an external battery again, connect a fully charged one to the DC IN connector before unloading the internal battery pack.

Making operation continuous when operating with an internal battery alone

First connect a fully charged external battery to the DC IN connector, then change the internal battery.

Notes

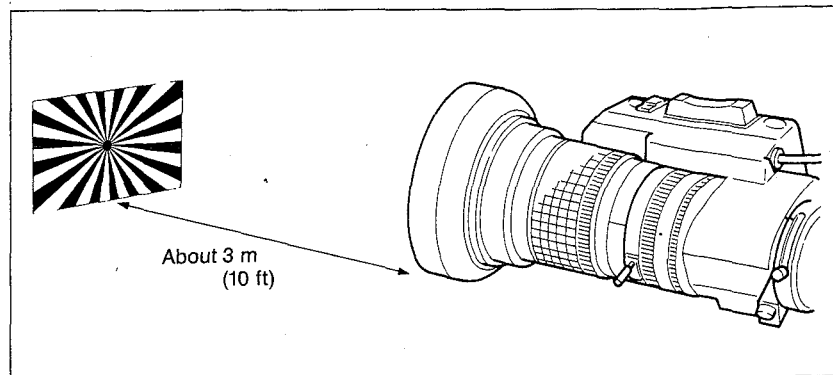
- When you load an internal battery pack and also connect an external battery to the DC IN connector, it is always the external battery that serves as power supply.
- There may be some noise on the video signal at the instant the power supply is switched.

3-4 Adjusting the Flange Focal Length

If the lens does not stay properly in focus as you zoom from telephoto to wide angle, adjust the flange focal length (the distance from the plane of the lens mounting flange to the imaging plane). Be sure to make this adjustment after mounting the lens for the first time or after changing the lens.

Adjusting the flange focal length

The positions of the controls for making this adjustment vary somewhat from lens to lens. Check the identification of the various controls in the manual supplied with the lens.



Adjusting the flange focal length

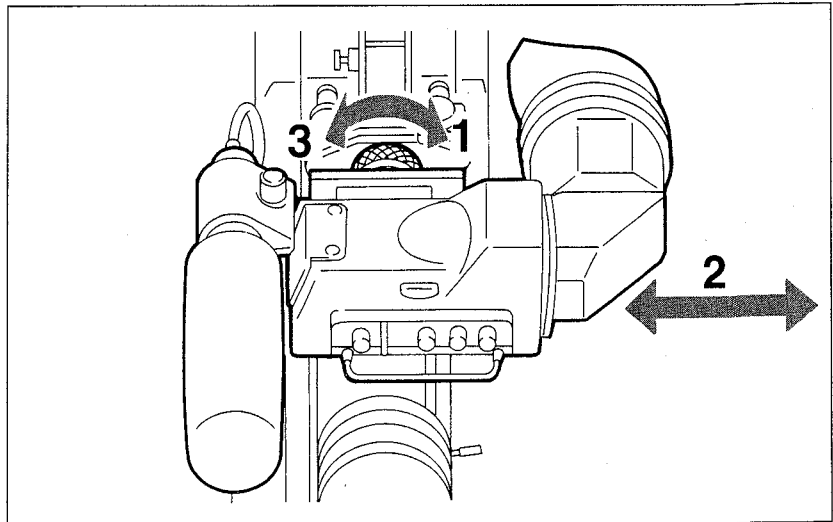
- 1** Set the iris control to manual.
- 2** Open the iris. Place the flange focal length adjustment chart about 3 m (10 ft) away from the camera, lit well enough to provide a satisfactory video output level.
- 3** Loosen the fixing screws on the Ff ring (flange focal length adjusting ring).
- 4** Use the manual or power zoom to set the lens to telephoto.
- 5** Point the camera at the chart, and focus on it.
- 6** Set the zoom to wide angle.
- 7** Turn the Ff ring until the chart is in focus, being careful not to disturb the focusing ring.
- 8** Repeat Steps 4 to 7 until the chart stays in focus all the way from wide angle to telephoto.
- 9** Tighten the Ff ring fixing screws.

3-5 Adjusting the Viewfinder

You can adjust the viewfinder position in left-right and front-back directions, for maximum viewing convenience.

3-5-1 Adjusting the Position

Adjusting to left or right



Adjusting the position to left or right

- 1** Loosen the viewfinder left-right positioning ring.
- 2** Slide the viewfinder sideways to the most convenient position.
- 3** Tighten the viewfinder left-right positioning ring.

Storing the unit in the carrying case

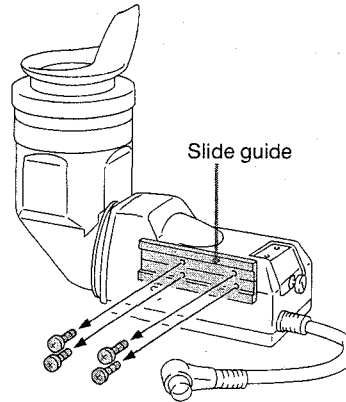
Always store the unit with the viewfinder moved fully in the direction opposite to the barrel, and the viewfinder left-right positioning ring fastened.

3-5 Adjusting the Viewfinder (Continued)

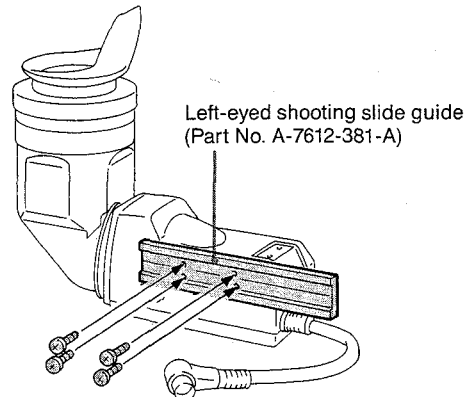
- 4** Remove the viewfinder from the unit.

See Section 3-5-3 "Detaching the Viewfinder" (page 3-18).

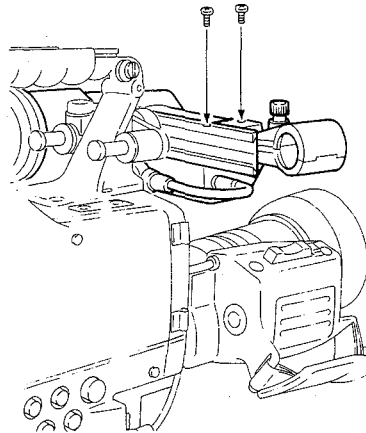
- 5** Detach the slide guide from the viewfinder.



- 6** Attach the left-eyed shooting slide guide.



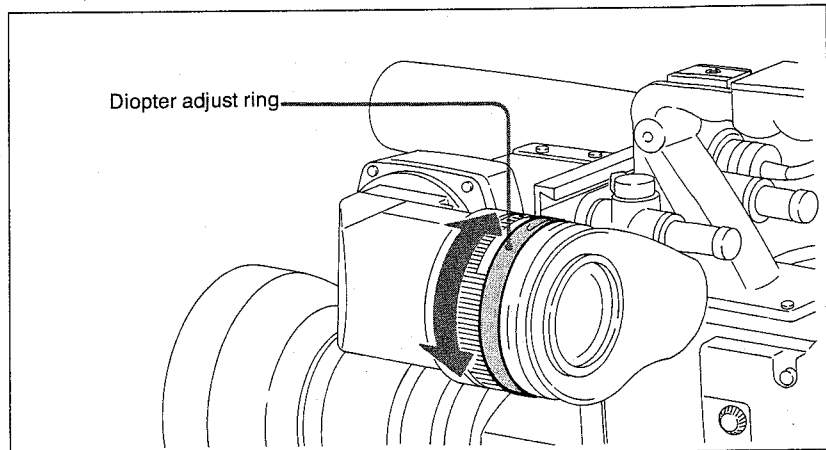
- 7** Fit the viewfinder back on the unit, and attach the microphone holder to the viewfinder using the screws removed in Step 2.



3-5-2 Adjusting the Focus and Screen of the Viewfinder

Adjusting the viewfinder focus

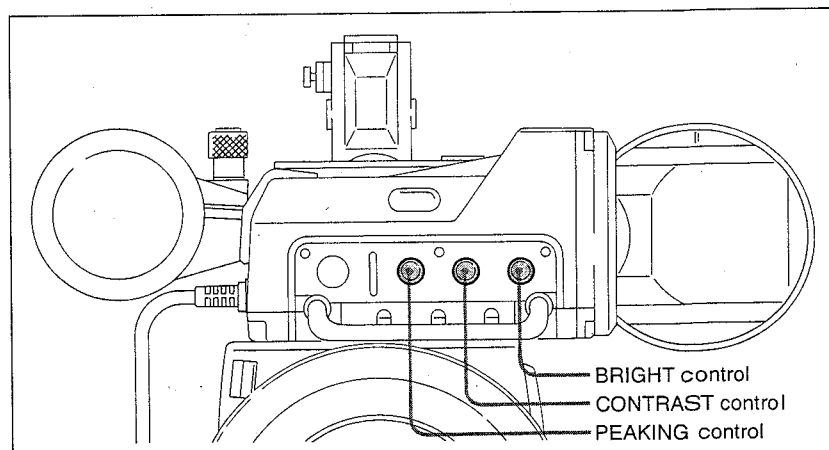
Turn the diopter adjust ring until the viewfinder image is sharpest for your eyesight.



Adjusting the viewfinder focus

Adjusting the viewfinder screen

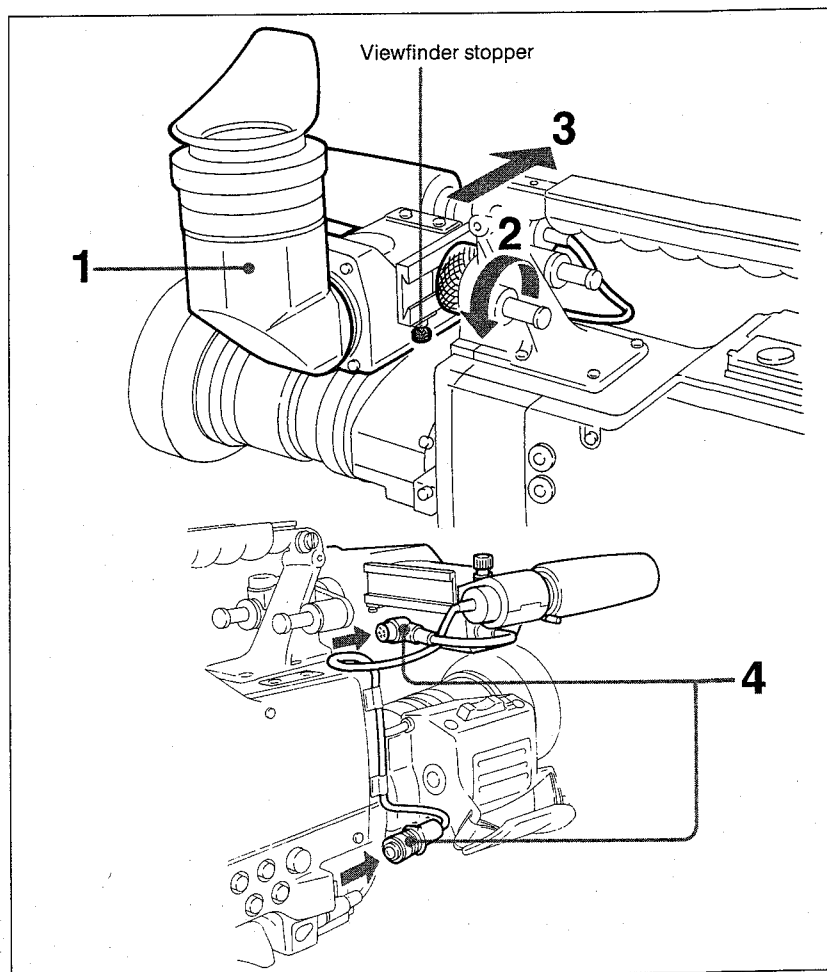
You can adjust the brightness, contrast and peaking of the viewfinder screen with the controls illustrated below.



Adjusting the viewfinder screen

3-5 Adjusting the Viewfinder (Continued)

3-5-3 Detaching the Viewfinder



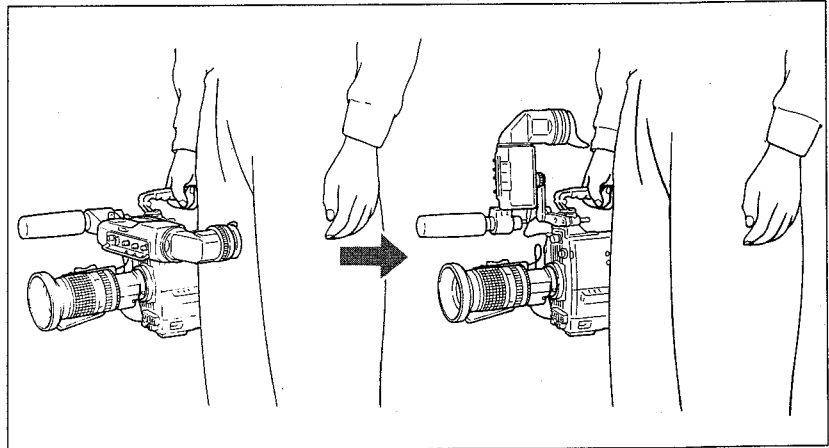
Detaching the viewfinder

- 1** Point the barrel up or down.
- 2** Loosen the viewfinder left-right positioning ring.
- 3** Holding the viewfinder stopper down, slide the viewfinder in the direction of the arrow, and detach.
- 4** Remove the viewfinder cable and microphone cable from the clamps, and disconnect.

About the viewfinder rotation bracket

By fitting a BKW-401 viewfinder rotation bracket (not supplied), you can rotate the viewfinder out of the way to avoid that your right leg hits the viewfinder while carrying the unit.

For details refer to the manual for the BKW-401.



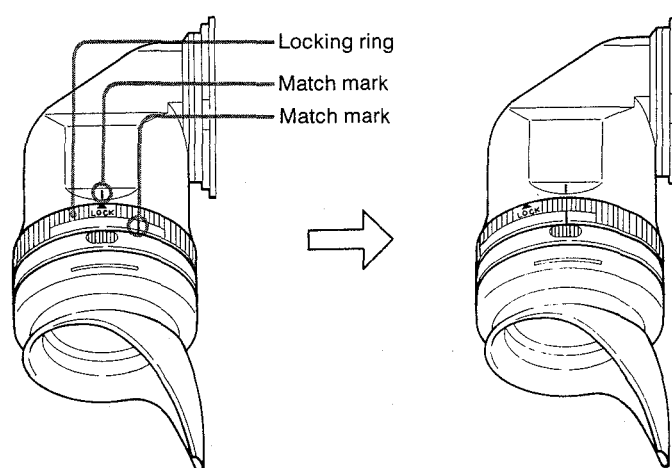
Using the BKW-401 viewfinder rotation bracket

3-5 Adjusting the Viewfinder (Continued)

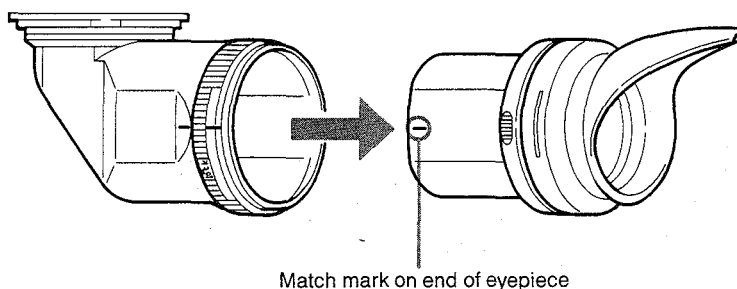
3-5-4 Detaching the Eyepiece

By removing the eyepiece you can get a clear view of the screen from further away. It is also easy to remove dust from the CRT screen and mirror when the eyepiece is detached.

- 1 Turn the eyepiece locking ring fully counterclockwise, to line up the red match marks on the locking ring and the viewfinder barrel.



- 2 Detach the eyepiece.



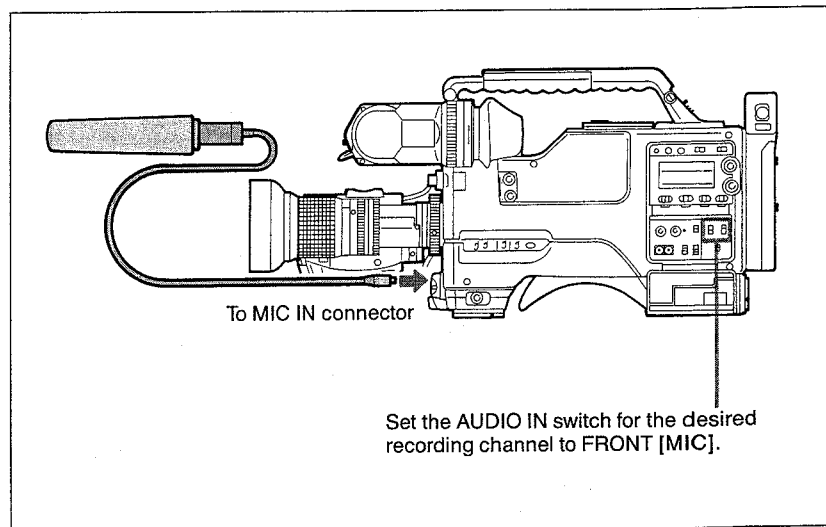
Refitting the eyepiece

- 1 Align the match mark on the eyepiece locking ring with that on the viewfinder barrel.
- 2 Align the match mark on the eyepiece end (see the illustration to Step 2 for eyepiece detachment) with those on the eyepiece locking ring and viewfinder barrel, then insert the eyepiece into the viewfinder barrel.
- 3 Turn the eyepiece locking ring clockwise until its "LOCK" indication arrow head points at the match mark on the viewfinder barrel.

3-6 Audio Input System

3-6-1 Using the Supplied Microphone

Using the microphone detached from the camera unit



Using the microphone detached from the camera unit

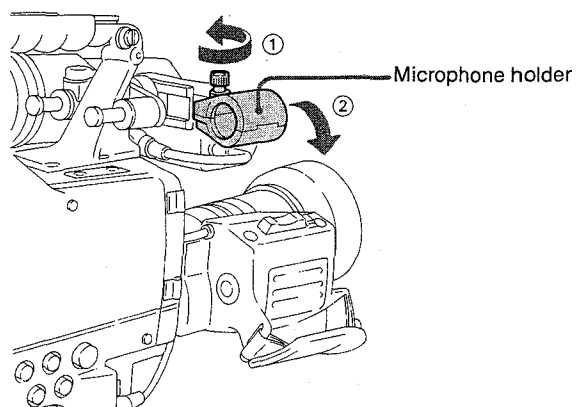
Note

When using the supplied microphone with an extension cable, always use a phantom feed type cable.

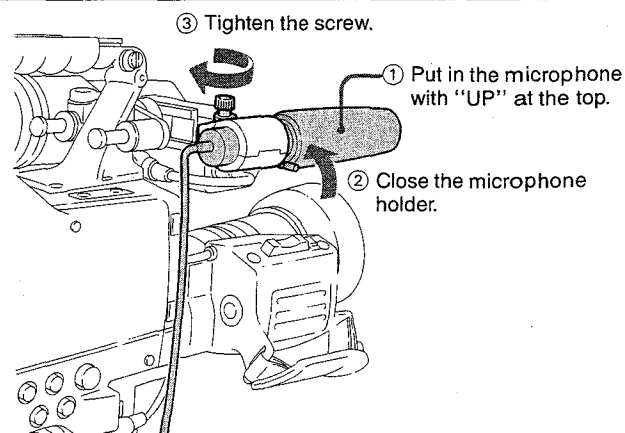
3-6 Audio Input System (Continued)

Using the microphone attached to the unit

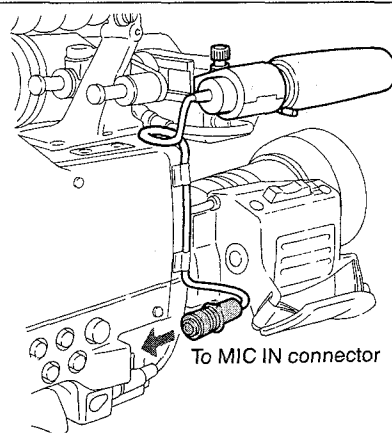
- 1** Loosen the screw, and open the microphone holder.



- 2** Put the microphone in the microphone holder.



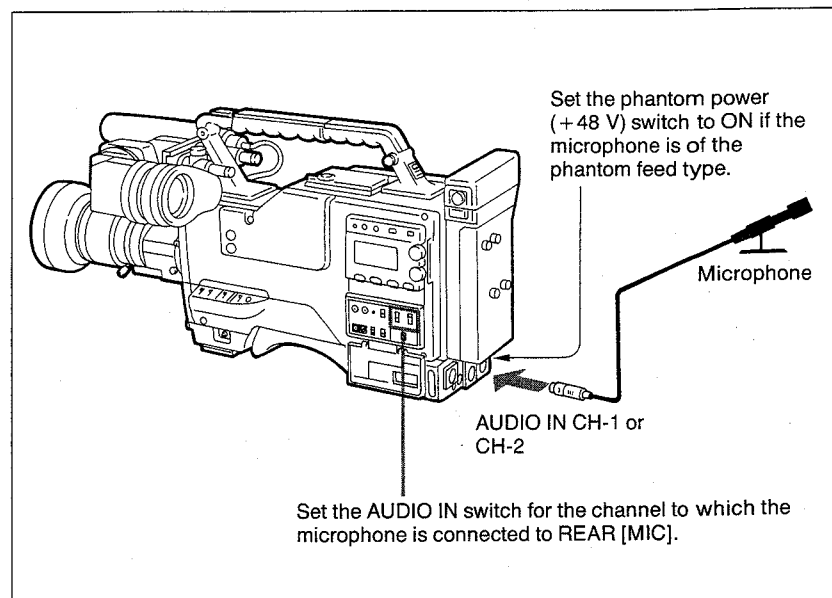
- 3** Plug the microphone cable into the MIC IN connector, and set the AUDIO IN switch for the desired recording channel to FRONT [MIC].



3-6-2 Using an External Microphone

Using the AUDIO IN CH-1 and CH-2 connectors, you can connect up to two external microphones. When you use a phantom feed type microphone, set the phantom power (+48 V) switch for the appropriate AUDIO IN connector to ON.

Using a detached external microphone



Using a detached external microphone

3-6 Audio Input System (Continued)

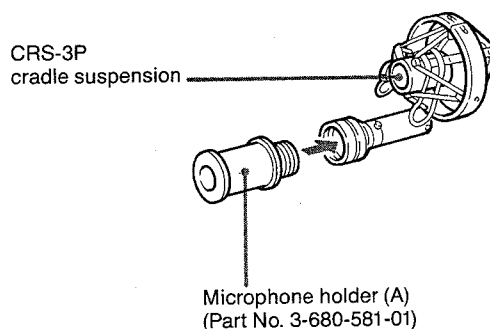
Using an external microphone attached to the unit

You can attach an external microphone to the unit by using a CAC-12 microphone holder (not supplied). Additionally, using a CRS-3P cradle suspension (not supplied), you can reduce the recording level of mechanical vibration noise from the VTR, and can also attach a long microphone. Note, however, that use of the CRS-3P requires a microphone holder (A), which is not supplied with the CRS-3P.

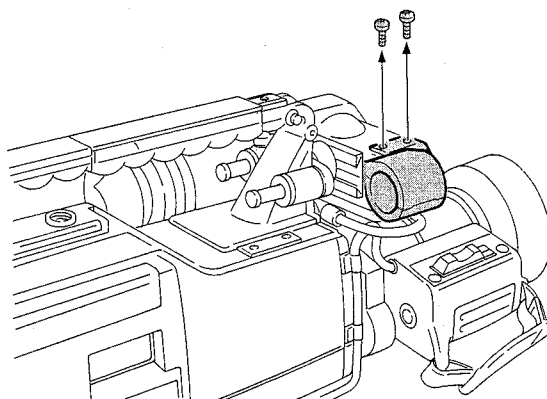
The procedure for attaching an external microphone using a CAC-12 and CRS-3P is shown below.

Refer to the manual for the microphone holder or cradle suspension for more details.

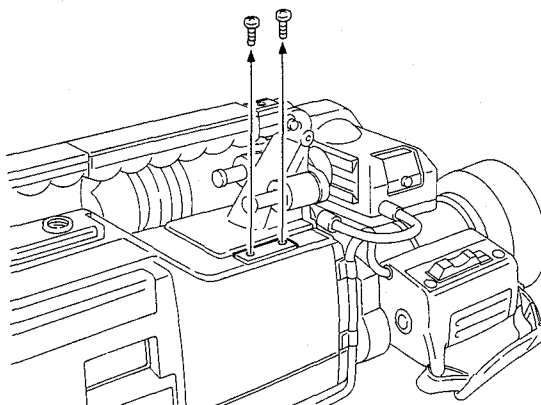
- 1 Assemble the CRS-3P cradle suspension and microphone holder (A) (Part No. 3-680-581-01).



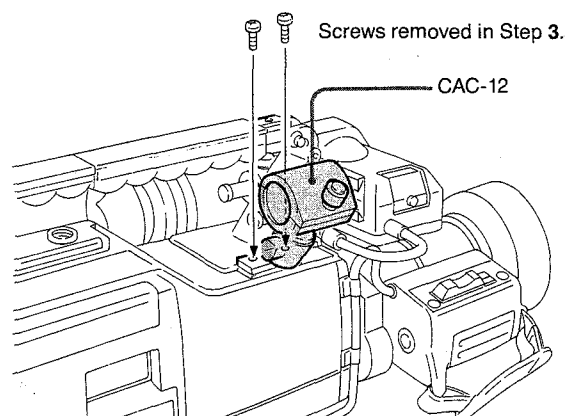
- 2 Detach the microphone holder from the viewfinder.



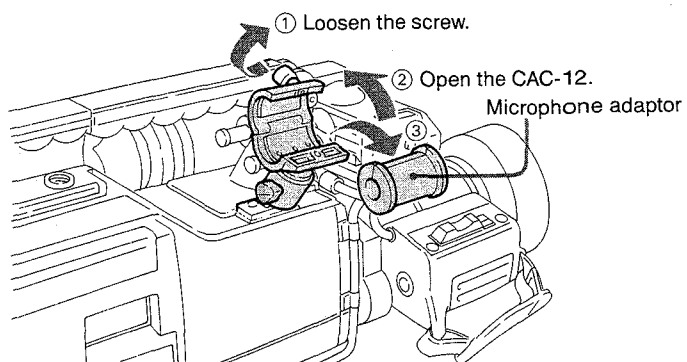
- 3** Remove the external microphone holder fixing screws.



- 4** Attach the CAC-12 microphone holder.



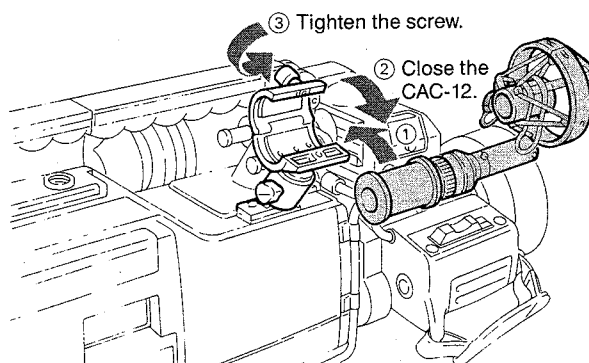
- 5** Open the CAC-12 and remove the microphone adaptor.



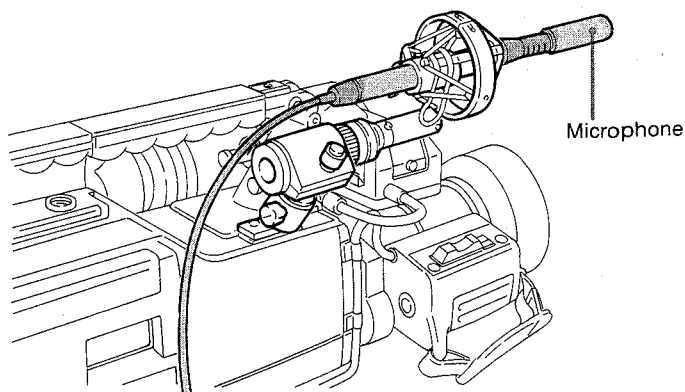
(Continued)

3-6 Audio Input System (Continued)

- 6** Mount the assembly from Step 1 in the CAC-12.



- 7** Fit the microphone in the suspension.



- 8** Connect the microphone cable to the AUDIO IN connector for channel 1 or 2 (and set the phantom power (+48 V) switch to ON if the microphone is of the phantom feed type), and set the corresponding AUDIO IN switch to REAR [MIC].

Notes

- You can only connect a phantom feed type microphone to the MIC IN connector.
- Be sure to set the appropriate phantom power (+48 V) switch to ON if a microphone you connect to the AUDIO IN CH-1/CH-2 connector is of the phantom feed type, or to OFF if not.

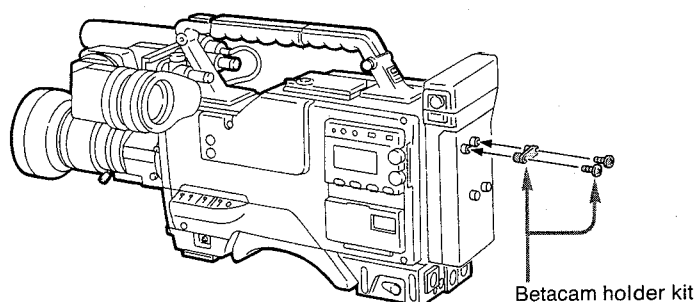
3-6-3 Attaching a UHF Portable Tuner (for UHF Wireless Microphone)

To use a Sony wireless microphone system, you will need to fit a WRR-28L or WRR-27 UHF portable tuner.

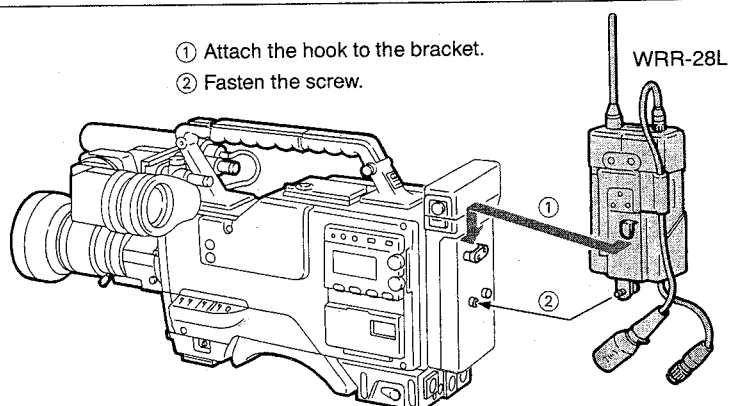
To attach the WRR-28L, insert it in its case, and using the Betacam holder kit supplied with the WRR-28L, attach to the camera unit as shown below.

Refer to the manual for the UHF portable tuner for more details.

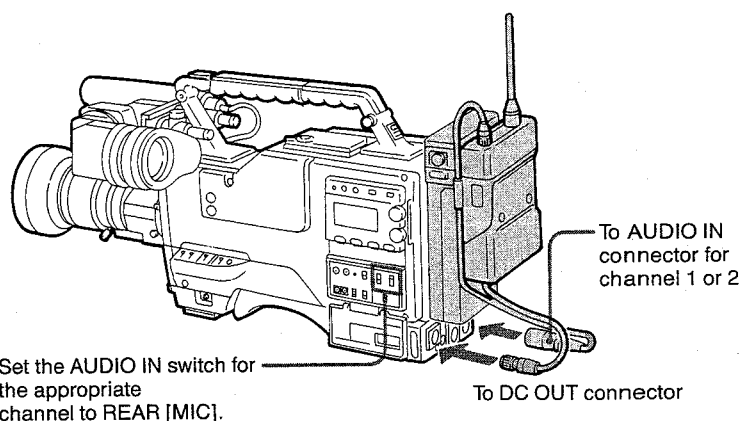
- 1 Attach the Betacam holder kit to the battery case.



- 2 Mount the tuner on the battery case.



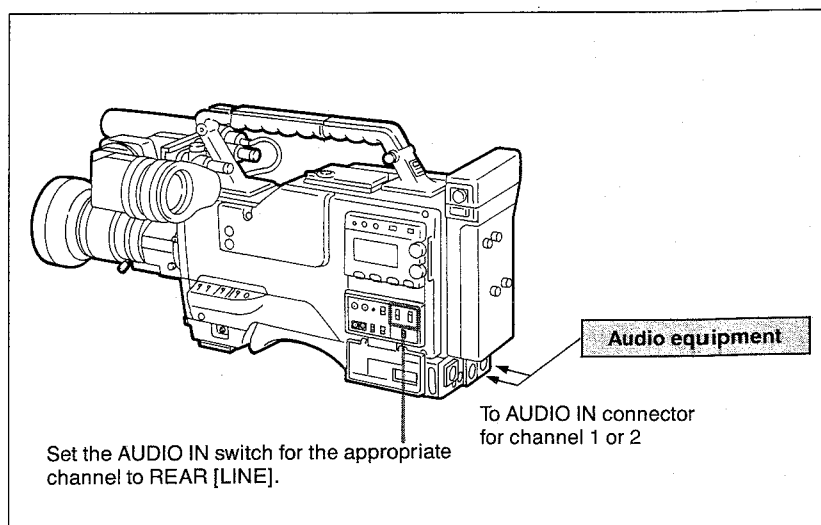
- 3 Connect the tuner power cable to the DC OUT connector on the unit, and the audio output cable to the AUDIO IN connector for channel 1 or 2.



3-6 Audio Input System (Continued)

3-6-4 Connecting Line Input Audio Equipment

Connect the audio output connector of the audio equipment to supply the line input signal to the AUDIO IN connector for channel 1 or 2.

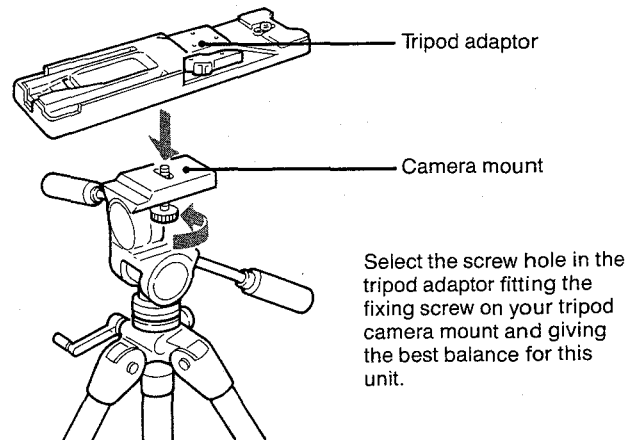


Line input connection

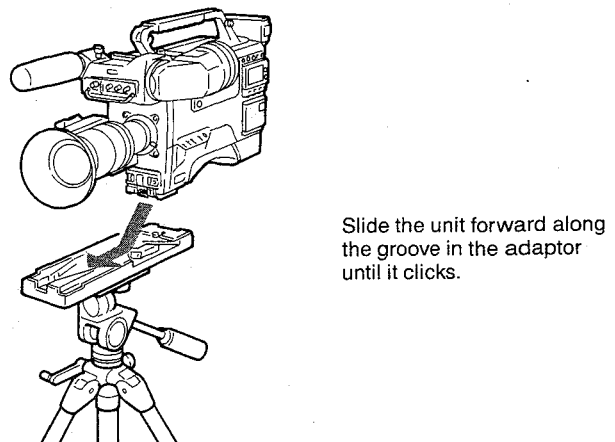
3-7 Tripod Mounting

Using the tripod adaptor supplied, tripod mounting and dismounting is very easy.

- 1 Attach the tripod adaptor to the tripod.

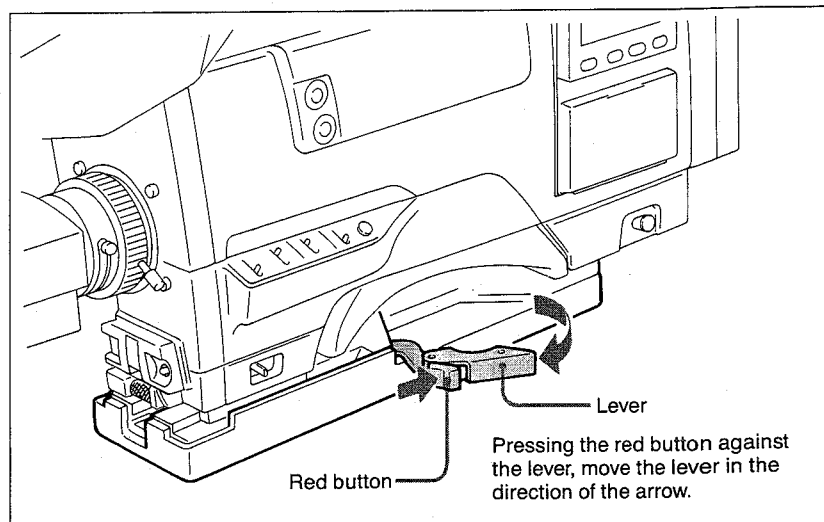


- 2 Mount the camera unit on the tripod adaptor.



3-7 Tripod Mounting (Continued)

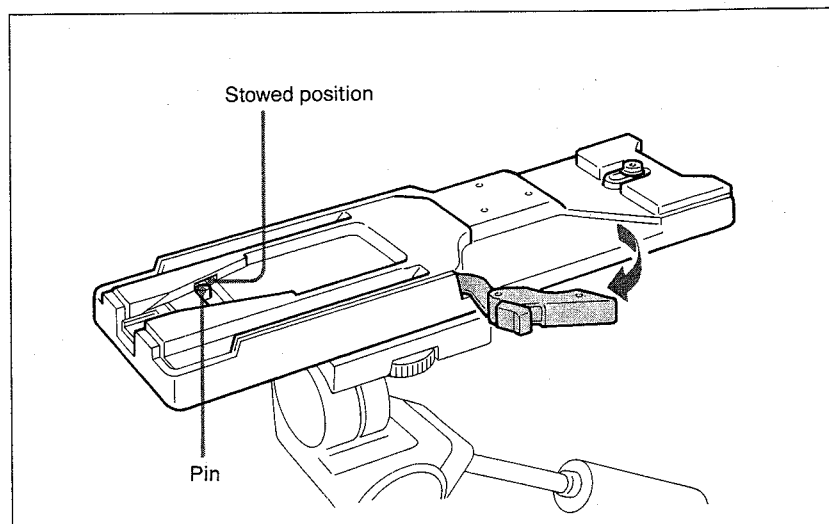
Dismounting the unit from the tripod adaptor



Dismounting the unit from the tripod adaptor

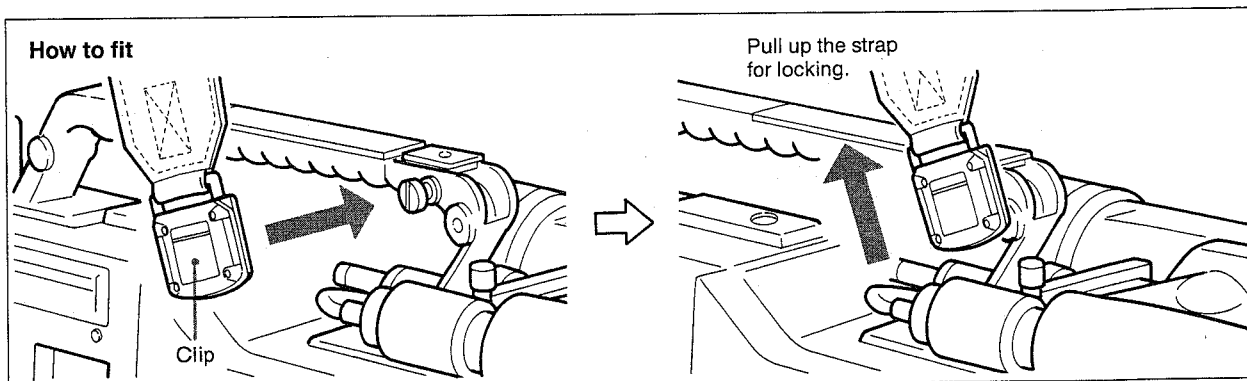
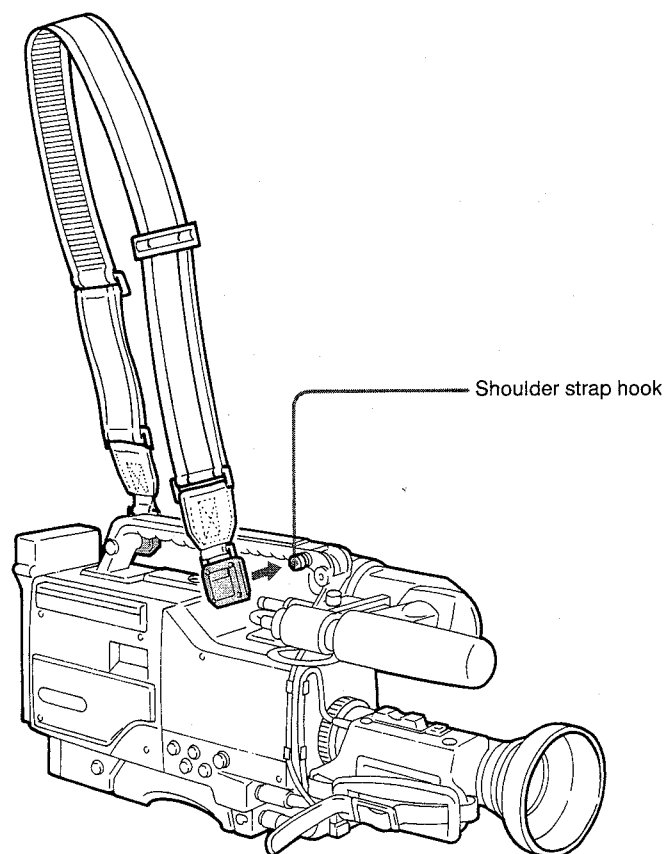
Note

The tripod adaptor pin may remain in the engaged position even after the unit is removed. If this happens, once again press the red button against the lever and move the lever in the direction of the arrow, until the pin returns to its stowed position. If the pin remains in the middle (engaged position) you cannot mount the unit on the tripod adaptor.

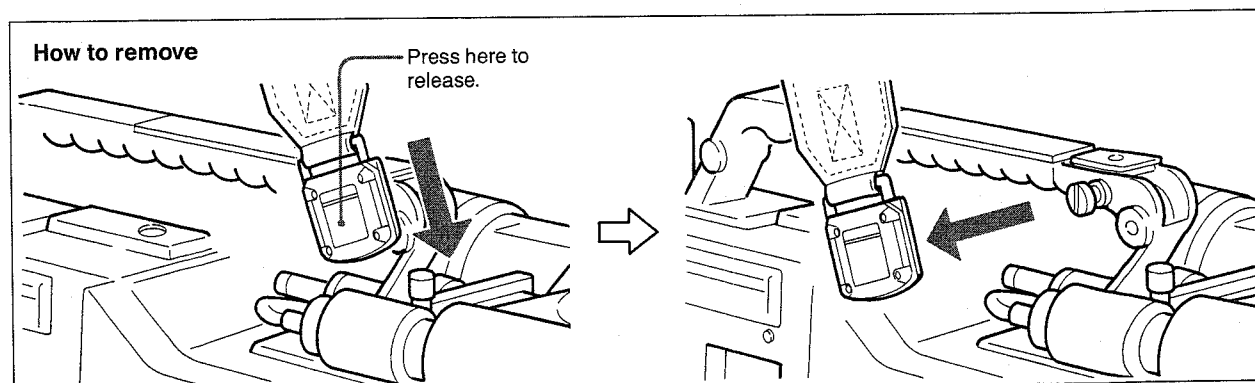


If the pin remains in the middle

3-8 Fitting the Shoulder Strap



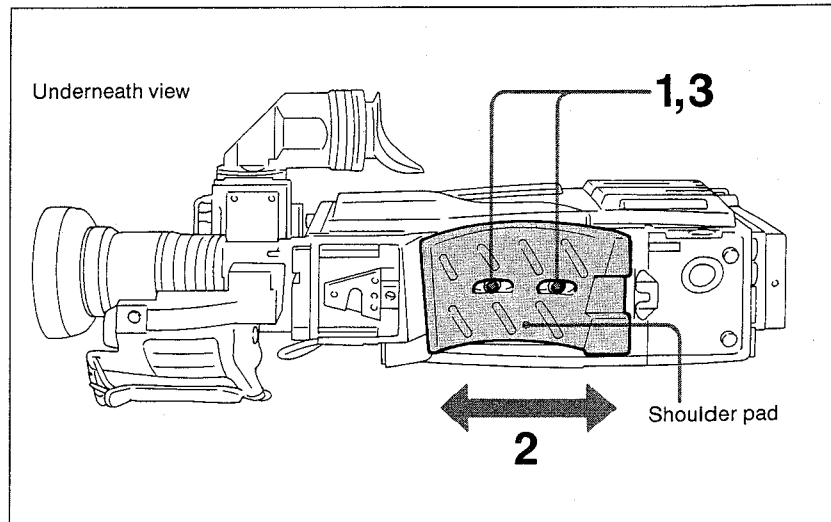
Fitting the shoulder strap



Removing the shoulder strap

3-9 Adjusting the Shoulder Pad Position

You can shift the shoulder pad from its center position to front or rear by up to 1 cm (3/8 inches). Use this adjustment to get the best balance for shooting with the camera on your shoulder.

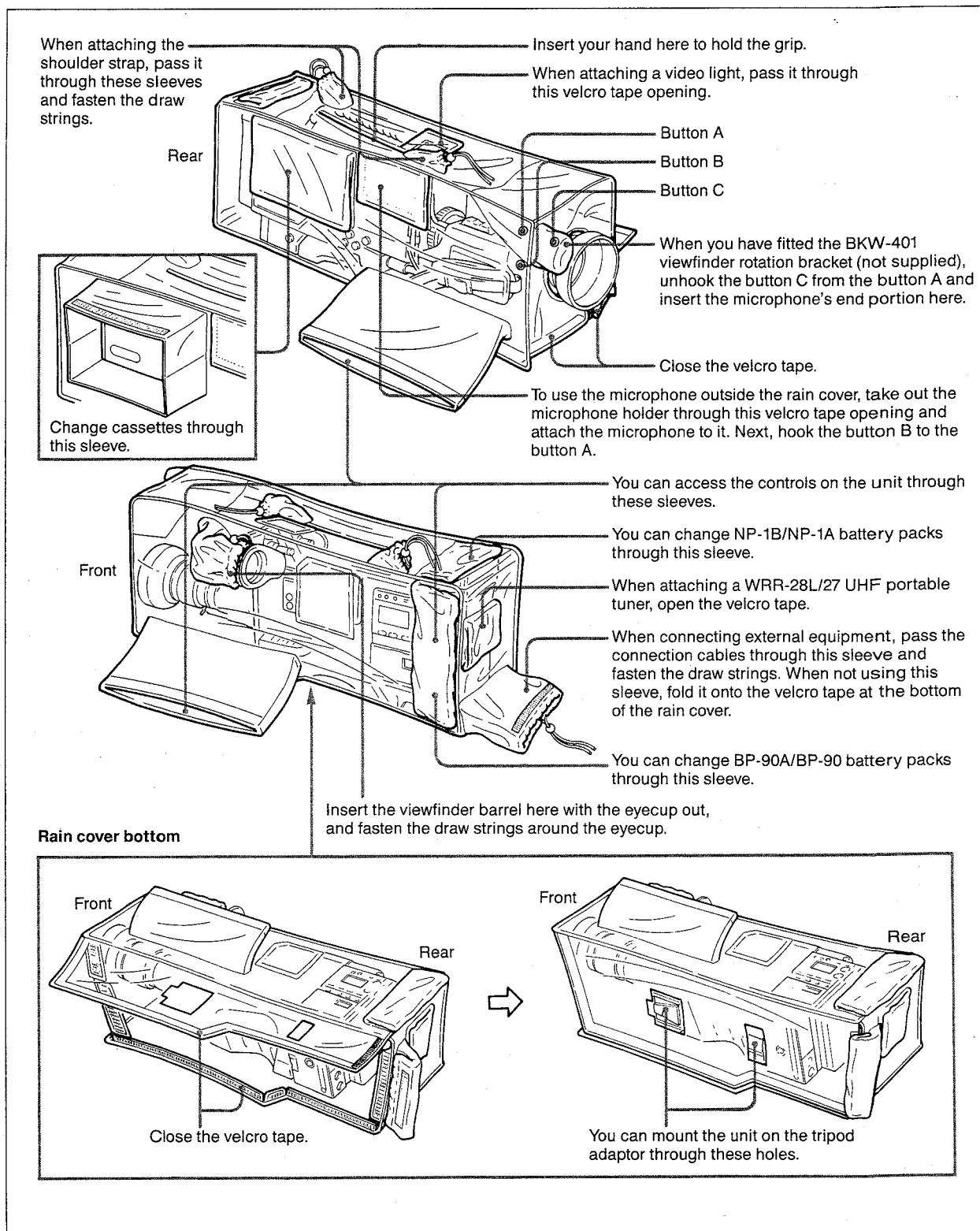


Adjusting the shoulder pad position

- 1** Loosen the two screws.
- 2** Slide the shoulder pad to the front or the rear, until it is in the most convenient position.
- 3** Tighten the screws.

3-10 Putting on the Rain Cover

Even when you have put the unit in the rain cover, you can change cassettes, reach the controls, and mount the unit on a tripod.

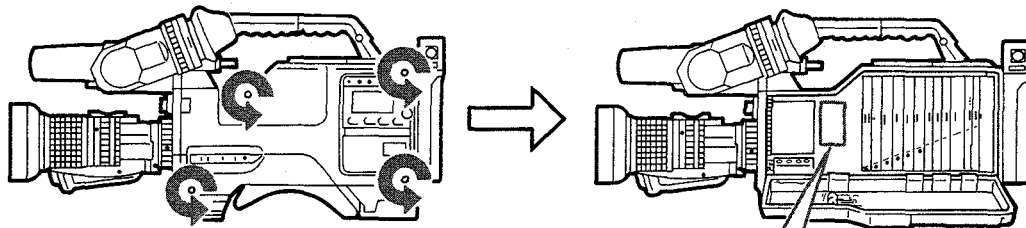


Putting on the rain cover

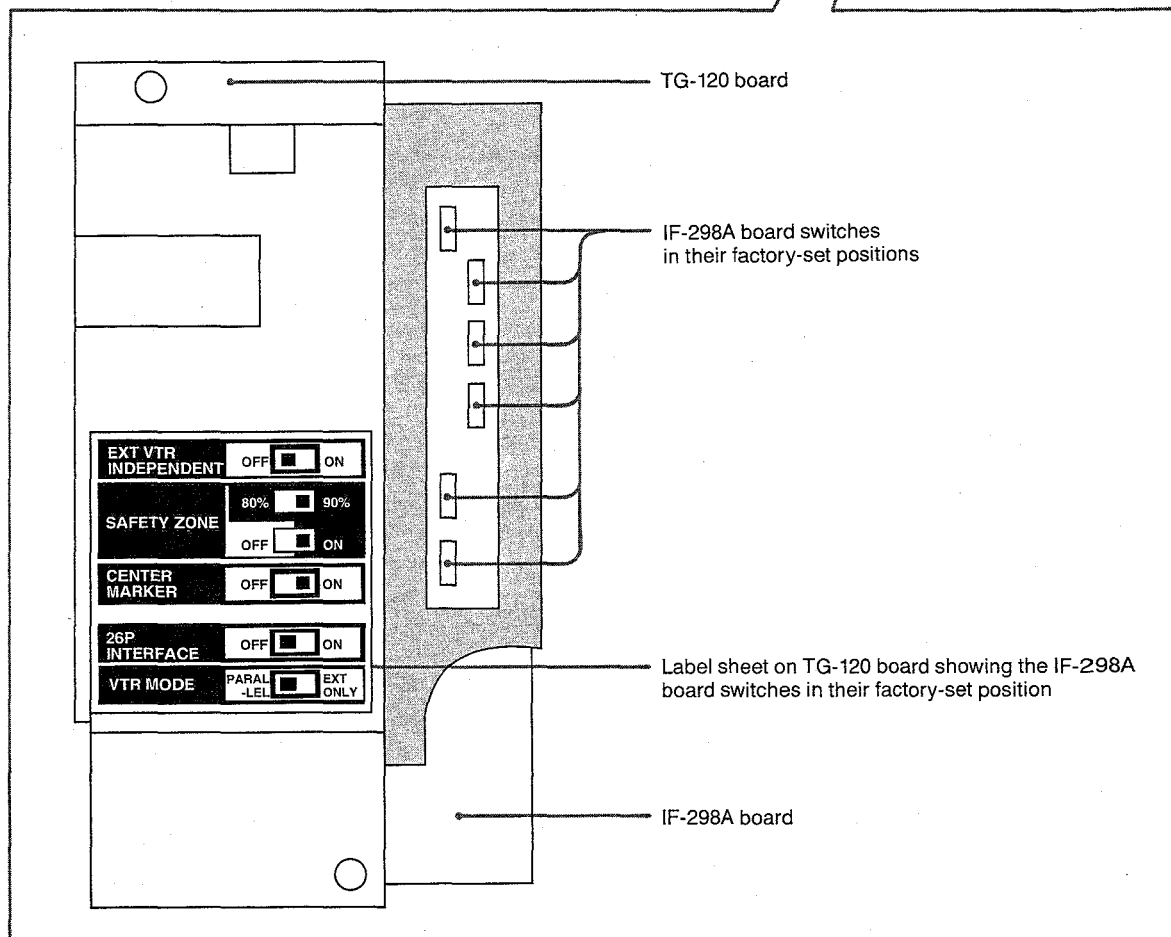
3-11 Internal Switch Settings for Marker Display and 26-pin Interface Control

The IF-298A board in this unit has switches for controlling the marker display functions and the settings for the 26-pin interface circuit when a BKW-402 VTR connector unit (not supplied) is fitted.

Accessing the switches on the IF-298A board



Loosen the four fixing screws on the side panel, and open the panel.



Factory settings

Switches on the IF-298A board

3-11-1 Marker Display Controls

Safety zone size

The SAFETY ZONE 80%/90% switch determines the size of the safety zone marker. This box indicates either 80% or 90% of the total area of the viewfinder screen.

Marker on/off switches

The SAFETY ZONE ON/OFF and CENTER MARKER ON/OFF switches control the display of the safety zone marker and center marker. When set to OFF, the particular marker never appears; when set to ON, display is controlled by the ZEBRA/MARKER switch on the front of the viewfinder.

Using other viewfinders

If you fit a viewfinder such as the BVF-3 3-inch viewfinder, even if the SAFETY ZONE and CENTER MARKER switches are set to ON, the markers will still not appear. To get them on the display, set the MARKER ON/OFF switch on the IF-298A board to ON.

Refer to the maintenance manual for more details.

3-11 Internal Switch Settings for Marker Display and 26-pin Interface Control (Continued)

3-11-2 Controlling the External VTR 26-pin Interface

If a BKW-402 VTR connector unit is attached, with the EXT VTR INDEPENDENT, 26P INTERFACE and VTR MODE switches at their factory settings, you can record simultaneously on the internal VTR and the external VTR connected to the 26-pin interface.

By changing the settings you can arrange that either one of the VTRs alone is controlled by switches on this unit.

Also, you can get component video or other signals from the 26-pin interface without connecting an external VTR. This allows you to use the unit as an independent component video camera rather than as a VTR camera.

The following table shows the settings and functions of the 26-pin interface control switches.

Settings and functions of 26-pin interface control switches

Switch	Setting	Function
EXT VTR INDEPENDENT	ON	You can control the external VTR independently by its own switches.
	OFF	You can control the external VTR from this unit. With the VTR START button you can control both VTRs together.
26P INTERFACE	ON	The 26-pin interface circuits are on, even if no external VTR is connected, so you can get component video or other signals from the 26-pin interface. If you set the VTR MODE to EXT ONLY, then the internal VTR will not operate.
	OFF	Unless you connect an external VTR to the 26-pin interface, the interface circuits are off, to save power.
VTR MODE	PARALLEL	With the VTR START button on the unit you can start and stop recording on the internal and external VTRs together. (The REW, F FWD and PLAY buttons leave the external VTR stopped.)
	EXT ONLY	If you connect an external VTR to the 26-pin connector, only the external VTR will operate and the internal VTR will not operate.

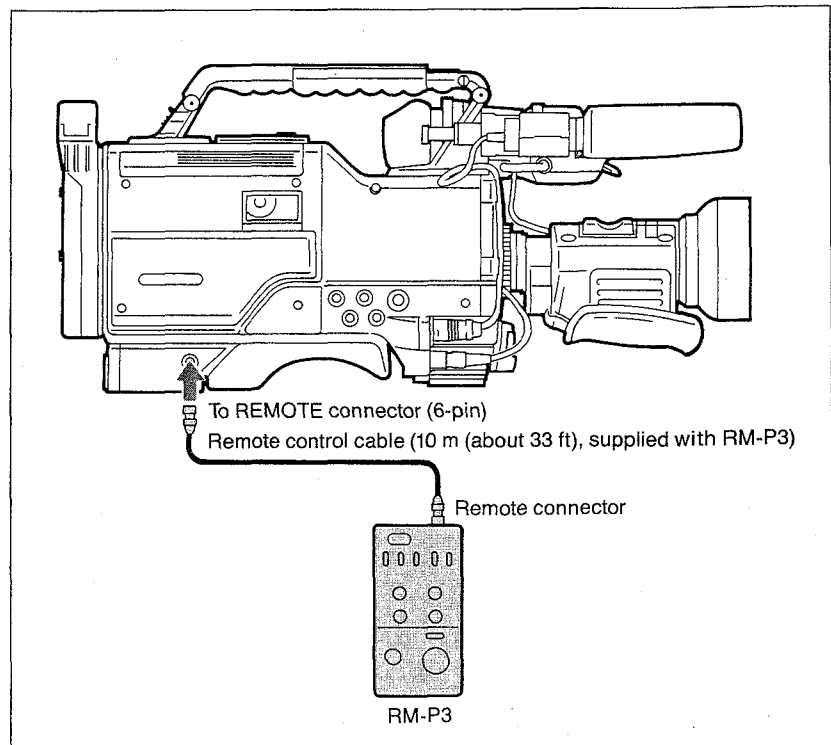
Also read Chapter 7 "Recording on an External VTR".

3-12 Connecting a Remote Control Unit

By connecting an RM-P3 remote control unit (not supplied), you can control the principal camera functions remotely.

Note

Once you connect the RM-P3 to the VTR camera, the camera will remain in the remote control mode even after disconnecting the RM-P3, unless you set the POWER switch of the camera to OFF.



Connecting a remote control unit

For details of operation, refer to the operation and maintenance manual for the RM-P3 remote control unit.

Chapter 4

Warnings and Indications in the Viewfinder and Display Panel

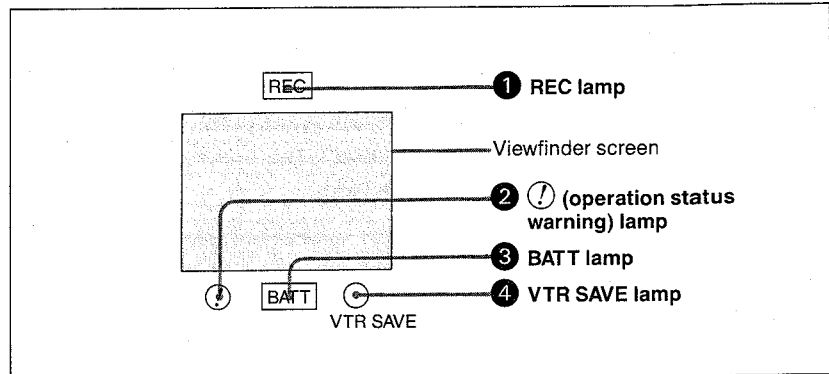
This chapter describes and explains the various messages and other indications which appear in the viewfinder or on the display panel.

Note that the viewfinder display while adjusting the black balance or white balance is described in Section 5-1 “Adjusting the Black Balance and White Balance” (page 5-3), and the display while adjusting the shutter speed in Section 5-2 “Setting the Electronic Shutter” (page 5-10).

4-1	Warnings and Indications in the Viewfinder	4-3
4-1-1	Lamp Indications.....	4-3
4-1-2	Screen Displays	4-4
4-2	Warnings and Indications in the Display Panel.....	4-7

4-1 Warnings and Indications in the Viewfinder

4-1-1 Lamp Indications



Viewfinder lamp indications

1 REC (recording) lamp

Lights while recording. Also flashes to indicate a problem.

See "Operation Warnings" (page A-3).

2 (operation status warning) lamp

Lights when you use the unit under one or more of the following conditions:

- the video gain level is +9 or +18 dB (namely the GAIN selector is set to 9 or 18),
- the lens extender is used,
- the electronic shutter is activated (namely the SHUTTER selector is set to ON).

3 BATT (battery) lamp

Flashes when the battery voltage falls, a few minutes before the power supply fails. When the voltage is too low for the unit to function, this lamp stays on continuously.

4 VTR SAVE lamp

Lights when the VTR SAVE/ST.BY switch is set to SAVE, but goes off during recording.

4-1 Warnings and Indications in the Viewfinder (Continued)

4-1-2 Screen Displays

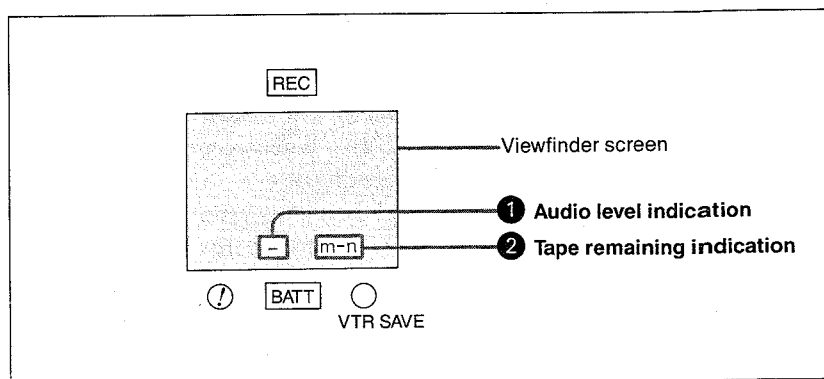
On the viewfinder screen you can get various pieces of information about audio level, tape remaining time, switch settings, and error messages.

When you operate the unit on an Anton Bauer Digital Magnum battery, the viewfinder screen can indicate the power remaining in the battery.

For more details see Section 3-2-5 "Using Anton Bauer Intelligent Battery System and Ultralight System" (page 3-10.)

Audio level and tape remaining time indications

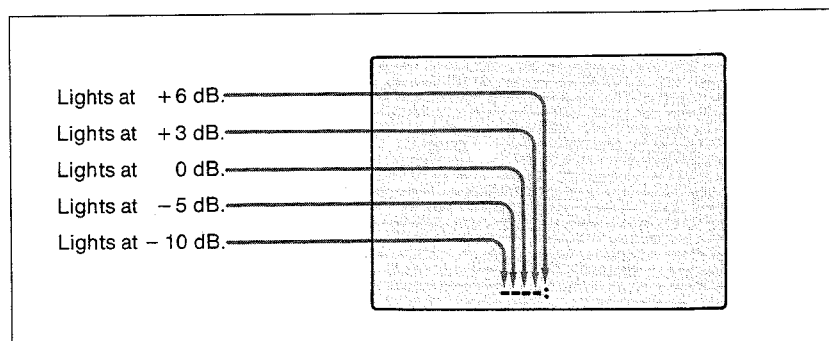
The audio level and tape remaining time indications are switched on and off together by the AUDIO IND switch.



Audio level and tape remaining indications

① Audio level indication

Shows the audio level on channel 1, when the AUDIO IND switch is on.



Audio level indication

② Tape remaining indication

Shown during recording, when the AUDIO IND switch is on.

Tape remaining indication

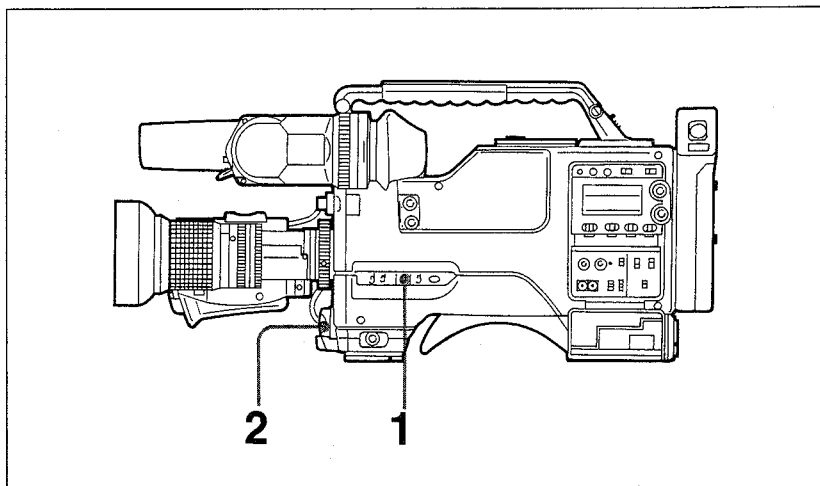
Display (m-n)	Tape time remaining
F-15	Full to 15 minutes
15-10	15 to 10 minutes
10-5	10 to 5 minutes
5-0 continuous	5 to 2 minutes
5-0 flashing	Less than 2 minutes

Switch settings and error message displays

The viewfinder screen shows various switch settings, error messages, and shutter speed information. There are three display modes, 1, 2 and 3, giving progressively more detailed information.

For details of shutter speed indications see Section 5-2 "Setting the Electronic Shutter" (page 5-10).

Selecting the display mode



Selecting the viewfinder screen display mode

- 1 Set the OUTPUT/DCC switch to BARS.

The color bars appear on the viewfinder screen.

- 2 Push the AUTO W/B BAL switch to WHT.

Each time you push the switch the display mode changes, in the sequence of 1 → 2 → 3 → 1,...

Once selected, the mode remains the same even when the power is turned off, for at least 10 years, then changes to the preset mode in memory, which is mode 3.

4-1 Warnings and Indications in the Viewfinder (Continued)

Switch setting displays

The settings of various switches and controls are shown for about 3 seconds after they are changed. Immediately after powering on the unit, the OUTPUT/DCC switch and WHITE BAL switch settings are also shown for about 3 seconds. The following table shows which items are displayed for each mode setting.

Switch setting displays

D: Displayed N: Not displayed

Switch or control	Setting display	Display mode		
		1	2	3
GAIN switch	GAIN: 0 dB (9 dB, 18 dB)	D	D	D
OUTPUT/DCC switch	DCC: ON (OFF)	D	D	D
FILTER selector	FILTER: 1 (2, 3, 4)	D	D	D
	WHITE: PRESET (A-CH, B-CH)	D	D	D
	<input type="checkbox"/> . <input type="checkbox"/> K (color temperature) ^{a)}	N	D	D
WHITE BAL switch	WHITE: PRESET (A-CH, B-CH) ^{b)}	D	D	D
	<input type="checkbox"/> . <input type="checkbox"/> K (color temperature) ^{a)}	N	D	D

a) Color temperatures are shown approximately in units of 1000 K.

b) When using an RM-P3 remote control unit, the display is as follows:

The setting of the W/B AUTO/MANU switch on the RM-P3	The setting of the WHITE BAL switch of the BVW-400A/400AP	Display
AUTO	A	WHITE: A
	PRST	WHITE: A
	B	WHITE: B
MANU	Anything	W/B: MANUAL

Error message displays

The following error messages are displayed, again depending on the display mode setting.

Error message displays

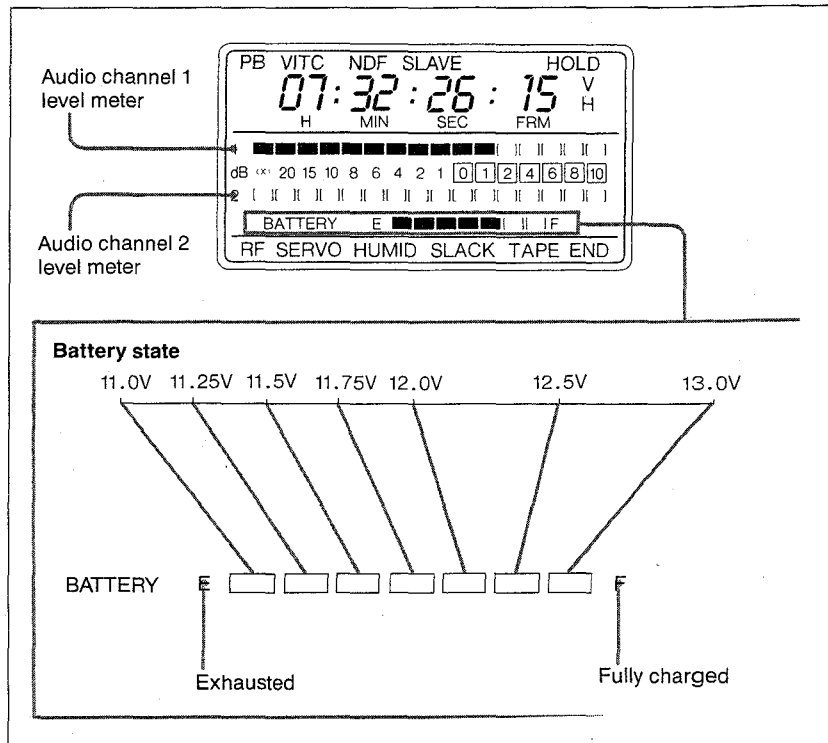
D: Displayed N: Not displayed

Display	Meaning and necessary action	Display mode		
		1	2	3
: MEMORY NG (colon flashing)	Black balance and white balance memory values have reverted to preset ones. Try again adjusting operation. If the result is the same, contact your Sony representative.	D	D	D
: LOW LIGHT (colon flashing)	Insufficient light; video level not up to standard value. Open the iris. If the result is the same, increase the gain.	N	N	D
MONITOR MODE	Internal switch setting is such that the camera section outputs only the green channel signal, instead of the Y signal, to the VIDEO OUT connectors and the VTR section. <i>On how to exit from the monitor mode, refer to the maintenance manual.</i>	D	D	D

4-2 Warnings and Indications in the Display Panel

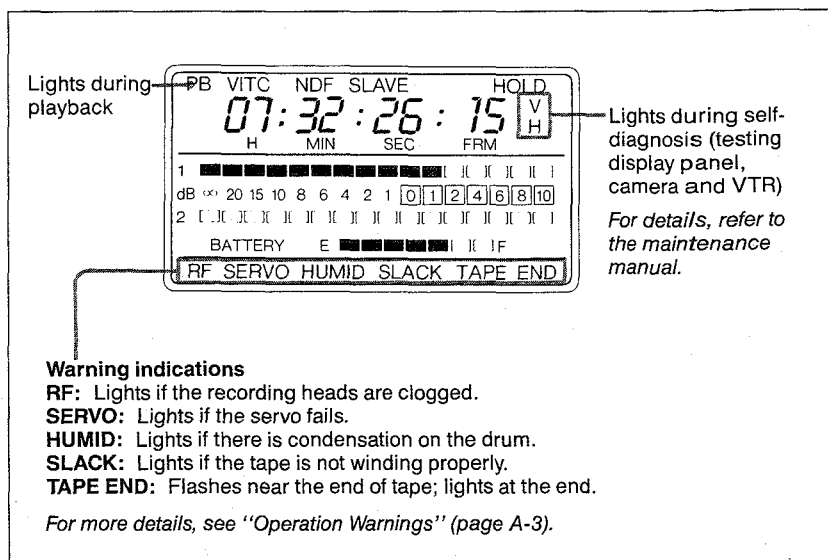
The display panel shows battery state, audio level, VTR status indications and time data.

Battery state and audio level indications



Battery state and audio level indications

VTR operating status indications



VTR operating status indications

[illegible]

Time code displays

Relation between switch settings and displays
The REAL TIME, F-RUN/R-RUN and DISPLAY switches, in that order of priority, determine the value displayed by the time counter.

Relation between switch settings and displays

REAL TIME switch setting	F-RUN/R-RUN switch setting	DISPLAY switch setting	Item shown
SET	Anything	Anything	Real time
ON or OFF	SET	TC or CTL	Time code
		U-BIT	User bits
	F-RUN or R-RUN	CTL	CTL
		TC	Time code
		U-BIT	User bits

Chapter 5

Adjustments and Settings for Recording

This chapter describes the adjustments of the black balance and white balance, shutter speed, and audio level, which are essential for high quality recording. It also discusses setting the time data to enable easy scene indexing for playback and editing.

5-1	Adjusting the Black Balance and White Balance.....	5-3
5-1-1	Adjusting the Black Balance	5-4
5-1-2	Adjusting the White Balance	5-6
5-2	Setting the Electronic Shutter	5-10
5-3	Adjusting the Audio Level	5-14
5-4	Setting Time Data	5-17
5-4-1	Setting the Time Code	5-17
5-4-2	Setting User Bits	5-19
5-4-3	Saving the Real Time in VITC.....	5-21
5-4-4	Locking the Time Code.....	5-22

5-1 Adjusting the Black Balance and White Balance

Adjust the black balance only in the following cases:

- When using the unit for the first time, or after a long period without using it.
- When using the unit after the temperature has changed dramatically.

The black balance setting is preserved even when the power is turned off, and it is not normally necessary to readjust it.

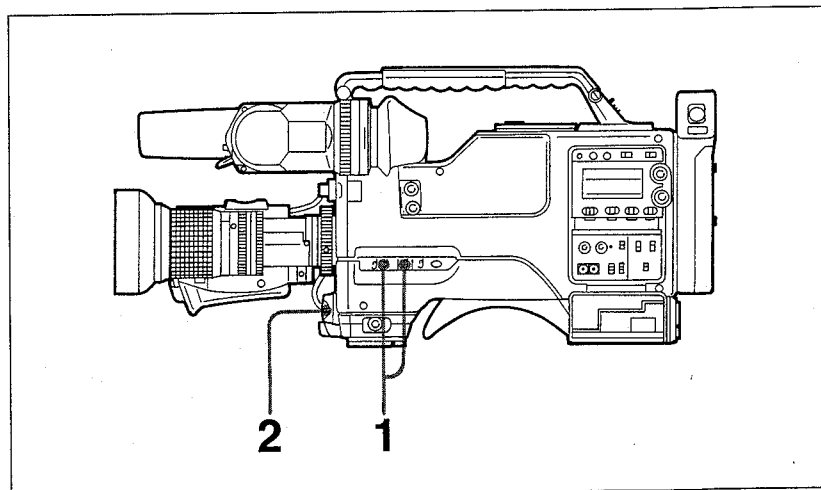
On the other hand, adjust the white balance each time the lighting condition (or the color temperature of the object you want to shoot) changes.

5-1 Adjusting the Black Balance and White Balance (Continued)

5-1-1 Adjusting the Black Balance

You can adjust the black balance automatically by using the AUTO W/B BAL switch, or manually on an internal circuit board. In automatic black balance adjusting mode, the unit first adjusts the black set, and then the black balance.

Refer to the maintenance manual for details of manual black balance adjustment.

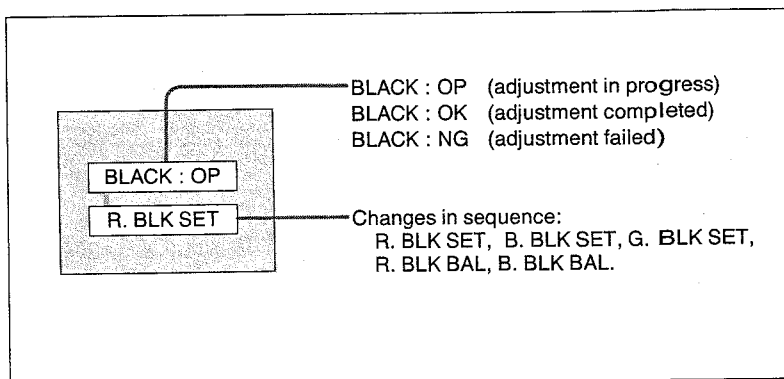


Adjusting the black set and black balance

- 1** Set the GAIN selector to 0 and OUTPUT/DCC selector to CAM.
- 2** Push the AUTO W/B BAL switch to BLK.

The switch automatically returns to the center position when you take your finger away.

While the adjustment is in progress, the following viewfinder display appears:



The black balance adjustment takes a few seconds, and then the adjustment settings are automatically stored in memory.

Notes

- The camera automatically closes the lens iris when you push the AUTO W/B BAL switch to BLK. If the lens is set to manual iris adjustment, you will need to open the iris manually after the black balance adjustment is completed.
- During the adjustment the gain switching circuit is automatically activated several times, so you may see flicker in the viewfinder or in the monitor. This is not a fault.

Black balance adjustment errors

When the message “BLACK : NG” appears in the viewfinder, one of the following messages also appears. Take appropriate action, then try the adjustment again.

Black balance adjustment errors

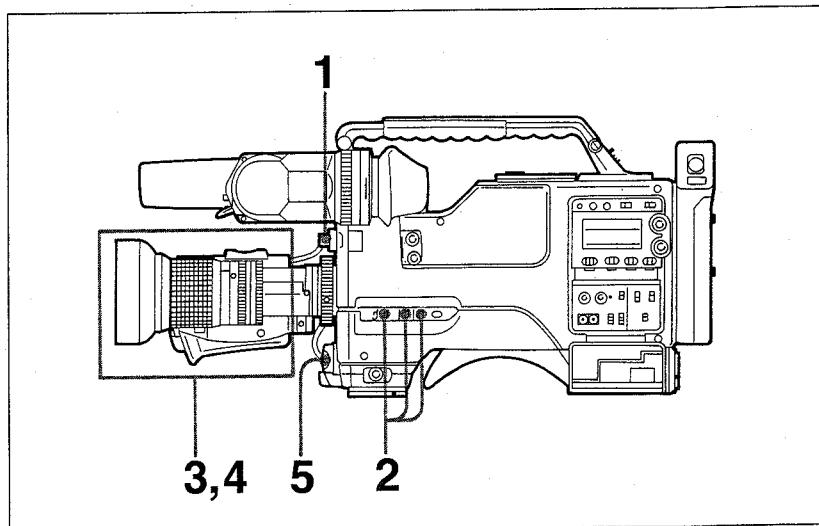
Display	Cause of failure
HARD ERROR TRY AGAIN	Black balance voltage could not be achieved.
OVERFLOW TRY AGAIN	Difference between standard value and current value is too large; outside adjustment range.
TIME LIMIT TRY AGAIN	Adjustment could not be made within the standard number of attempts.
IRIS : NOT CLOSED TRY AGAIN	The lens iris did not close.
BOUNCING : TOO LONG TRY AGAIN	Black set adjustment could not be made within the standard time limit.

Black balance memory

The memory is a non-volatile EEPROM, so the setting will be held for a long time (about 10 years).

5-1 Adjusting the Black Balance and White Balance (Continued)

5-1-2 Adjusting the White Balance



Adjusting the white balance

- 1 Select the appropriate position of FILTER selector for the illumination.

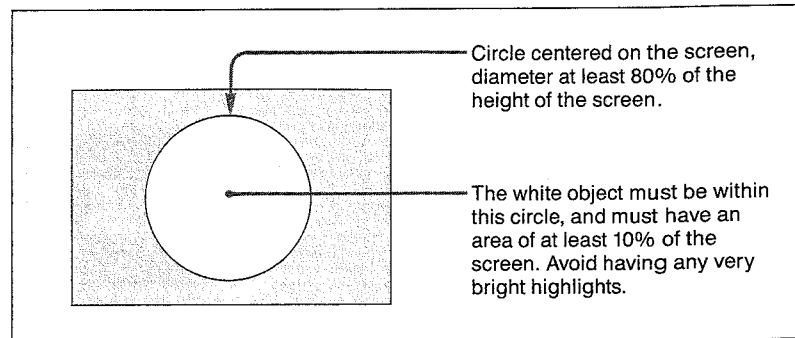
Selector position	Color temperature, ND	Shooting conditions
1	3200 K	Sunrise and sunset; studio
2	5600 K + 1/4 ND	Outdoors, clear skies
3	5600 K	Outdoors, cloud or rain
4	5600 K + 1/16 ND	Very bright conditions: snow, high altitudes, or seaside

- 2 Set the selectors as follows:
 - GAIN: 0
 - OUTPUT/DCC: CAM
 - WHITE BAL: A or B

- 3** Place a white test card in the same lighting conditions as the subject to be shot, and zoom it up.

Alternatively, you can use any white object, such as a cloth or wall, near the subject.

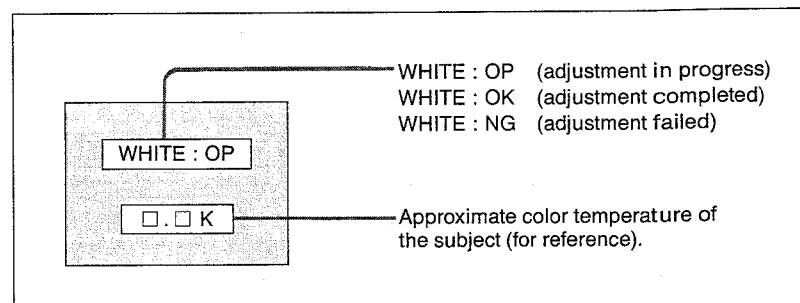
The absolute minimum white area is shown in the following diagram.



- 4** If the iris is set to manual adjustment, adjust it appropriately. If the lens has an automatic iris, set the iris adjustment switch to automatic.

- 5** Push the AUTO W/B BAL switch to WHT.

While the adjustment is in progress, the following viewfinder display appears:



The white balance adjustment takes a few seconds, and then the adjustment settings are automatically stored in the memory (A or B) selected with the WHITE BAL selector in Step 2.

Note

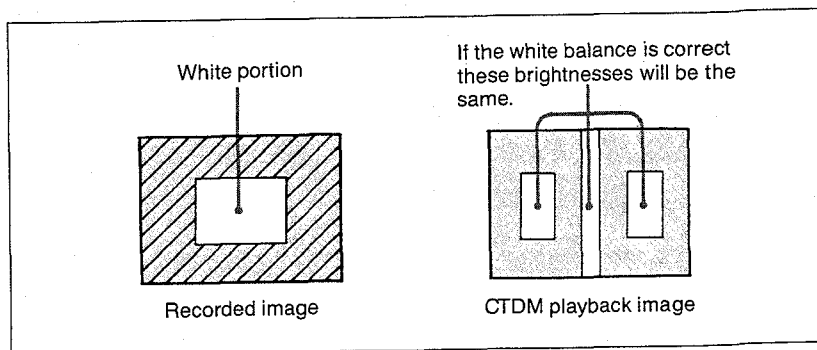
If the camera has a zoom lens with automatic iris, the iris may hunt during adjustment. To prevent this, turn the gain control (marked IG, IS or S) on the lens to minimum.

For more details, refer to the manual supplied with the lens.

5-1 Adjusting the Black Balance and White Balance (Continued)

Checking white balance recorded on the tape

Provided that there is sufficient white area recorded on the tape, you can check the white balance by means of CTDM playback. Press the PLAY button to start playback, then press the CTDM button. While the CTDM button is pressed you can check the white balance.



Checking the white balance using CTDM playback

White balance adjustment errors

When the message "WHITE : NG" appears in the viewfinder, one of the following messages also appears. Take appropriate action, then try the adjustment again.

White balance adjustment errors

Display	Cause of failure
LOW LEVEL TRY AGAIN	The video level was too low. Either make the illumination brighter, or increase the setting of the GAIN selector.
HARD ERROR TRY AGAIN	White balance voltage could not be achieved.
TIME LIMIT TRY AGAIN	Adjustment could not be made within the standard number of attempts.
C.TEMP. LOW CHG. FILTER TRY AGAIN	The color temperature was too low. Change the FILTER selector setting.
C.TEMP. HIGH CHG. FILTER TRY AGAIN	The color temperature was too high. Change the FILTER selector setting.

When there is no time for white balance adjusting operation

You can use the factory preset 3200 K or 5600 K white balance by setting the WHITE BAL selector to PRST. Set the FILTER selector to the position 1 for the preset 3200 K white balance, and the position 2, 3, or 4 for 5600 K.

White balance memory

Two separate memories A and B are provided for the white balance values on each of the filter settings. (4 filters \times 2 memories = total 8 values can be stored.)

Changing the number of memories

By changing switch settings on the internal board, you can set the memories so that there is only one for each of settings A and B; in other words, the memory value is unrelated to the filter setting.

For more details, refer to the maintenance manual.

5-2 Setting the Electronic Shutter

You can use the electronic shutter in the following modes:

- **Standard mode:** for shooting fast moving objects with very little blurring.
- **Clear Scan (CLS) mode:** for shooting, for example, computer screen displays whose scanning frequency is higher than 60 Hz (BVW-400A) or 50 Hz (BVW-400AP) without causing horizontal streaks to appear in the reproduced picture.
- **Extended Clear Scan (ECS) mode:** for shooting, for example, computer screen displays whose scanning frequency is lower than 60 Hz (BVW-400A) or 50 Hz (BVW-400AP) without causing horizontal streaks to appear in the reproduced picture.
- **Enhanced Vertical Definition System (EVS) mode:** for improved vertical resolution. This mode makes the electric charges on the CCD picture elements be output line by line, and integrated frame by frame instead of field by field. To prevent decrease in dynamic resolution due to frame integration, the EVS mode makes the electronic shutter operate at 1/60 second (BVW-400A) or 1/50 second (BVW-400AP), resulting in a decrease by half in CCD sensitivity

The following table lists up the shutter speeds available for the respective shutter operation modes.

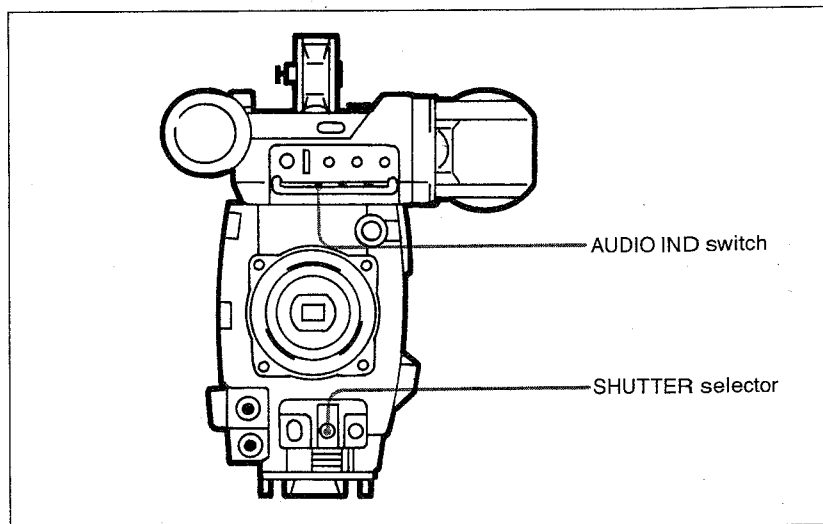
Available shutter speeds

Shutter operation mode	Shutter speed
Standard	1/100 (BVW-400A) or 1/60 (BVW-400AP), 1/125, 1/250, 1/500, 1/1000, and 1/2000 second
CLS	BVW-400A: 134 speeds in the range of 60.8 to 125.3 Hz
	BVW-400AP: 185 speeds in the range of 50.6 to 125.4 Hz
ECS	BVW-400A: 60 speeds in the range of 47.7 to 58.1 Hz
	BVW-400AP: 10 speeds in the range of 47.4 to 48.8 Hz
EVS	BVW-400A: 1/60 second
	BVW-400AP: 1/50 second

Notes

- Use of higher shutter speeds results in lower levels of CCD sensitivity regardless of the shutter operation mode.
- When using the automatic iris, the iris opens as the shutter speed increases, thus reducing the depth of field.
- In artificial light, particularly from fluorescent lamps or mercury lamps, even though the light intensity may appear to be constant, it actually is changing at the frequency of the power supply (“flicker”). If you use the electronic shutter under such lighting, it may make the flicker worse. With the BVW-400A (or BVW-400AP), if the frequency of the local power supply is 50 Hz (or 60 Hz), you can reduce flicker by setting the shutter speed to 1/100 (or 1/60).
- When you shoot, in ECS mode, a very bright object in such manner as its image almost occupies the whole picture area, the upper marginal zone of the reproduced picture may be of low quality. This is one of the typical phenomena with the CCD image sensors, and does not mean a malfunction of the camera.

Checking the shutter setting



Checking the shutter setting

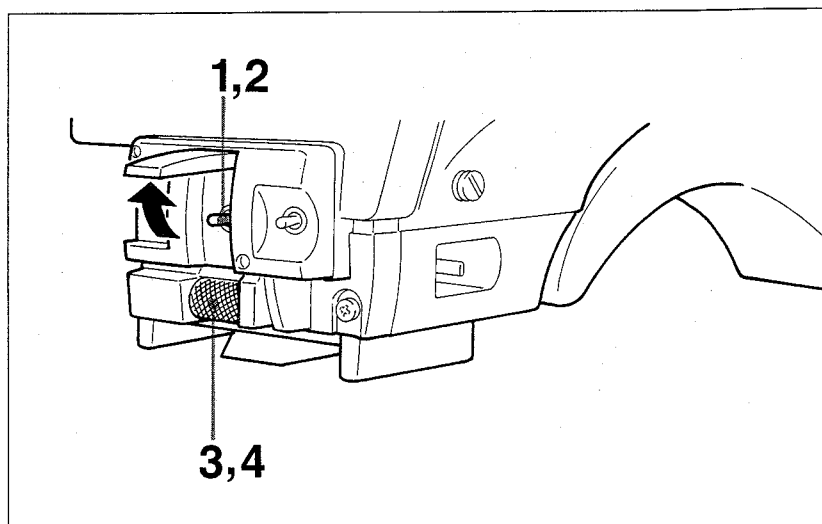
When you select the display mode 3 and set the AUDIO IND switch to OFF, the current shutter setting is always indicated in the viewfinder screen.

In other cases, move the SHUTTER selector from OFF to ON. The current shutter setting is indicated in the viewfinder for about three seconds regardless of the viewfinder display mode setting and the AUDIO IND switch setting.

The indication also appears when you change the shutter setting, again regardless of the viewfinder display mode and the AUDIO IND switch setting.

5-2 Setting the Electronic Shutter (Continued)

Changing the shutter setting



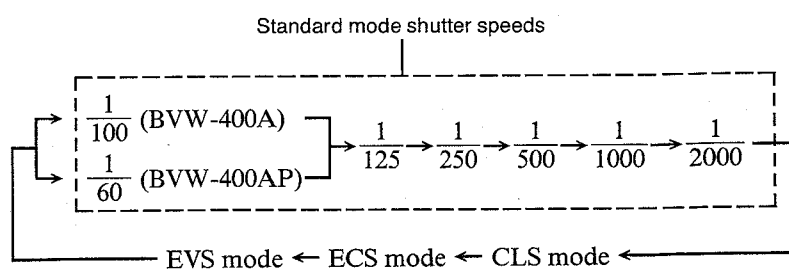
Changing the shutter setting

- 1 Push the SHUTTER selector from ON to SEL.

The currently selected shutter setting is indicated in the viewfinder screen.

Example: `:SS:1/250`

- 2 Push the SHUTTER selector again to SEL before the colon to the left of the setting indication disappears. By doing this repeatedly, you can cycle through the shutter settings as follows:



When you select the CLS or ECS mode, the current shutter speed in Hz is indicated.

Example: `:CLS:68.7HZ`

To change the CLS or ECS shutter speed, go to Step 3.

- 3 Rotate the Clear Scan control before the colon to the left of the CLS or ECS shutter speed indication disappears. This puts the unit into CLS or ECS shutter speed setting mode.

-
- 4** Rotate the Clear Scan control again before the colon to the left of the shutter speed indication disappears, to select the shutter speed matching the scanning frequency of the computer screen display you are going to shoot.
Rotating the control upward increases the speed and downward, decreases it.

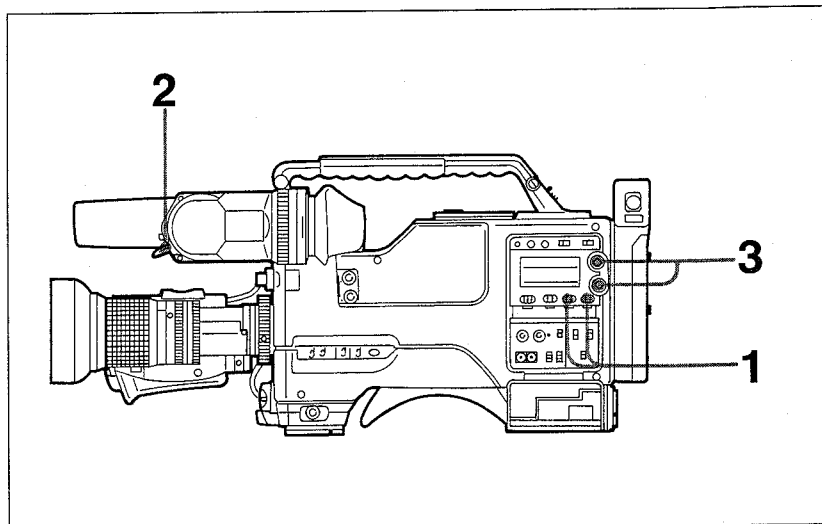
Note

Even when you turn the power off, the last selected shutter setting will be retained for a long time (about 10 years), and then it will revert to 1/100 (BVW-400A) or 1/60 (BVW-400AP) for initialization.

5-3 Adjusting the Audio Level

If you set the AUDIO SELECT switch for channel 1 or channel 2 to AUTO, the input level for the corresponding channel is adjusted automatically.

Use the following procedure for manual adjustment of the level for either audio channel.



Audio level manual adjustment

- 1** Set the AUDIO SELECT CH-1 and CH-2 switches to MAN (manual).
- 2** Turn the AUDIO LEVEL CH-1 control for channel 1 on the front of the viewfinder fully clockwise.
- 3** Turn the AUDIO LEVEL CH-1 and CH-2 controls, so that at the maximum sound level the level meter indicates +8 dB.

Limiter circuit

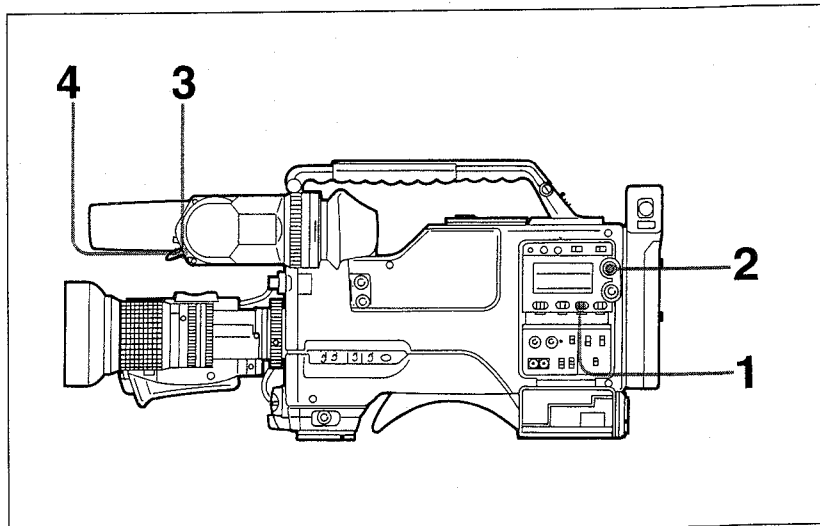
When you adjust the audio level manually, excessive audio input levels will activate a limiter circuit, which will attenuate a +30 dB input signal to about +10 dB.

AFM recording

Using metal tape, the audio signals recorded on the longitudinal tracks (normal audio tracks) are also recorded on the chrominance track in AFM mode.

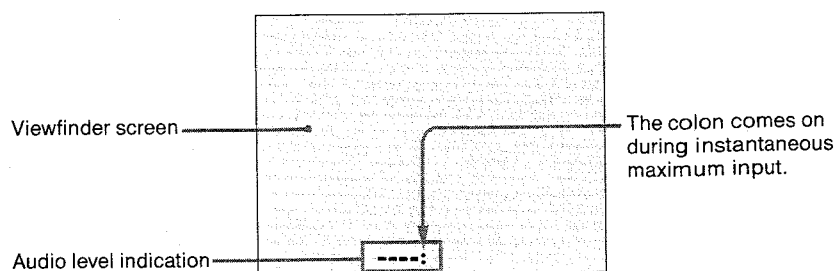
Adjusting the audio level of channel 1 from the front of the viewfinder

You can adjust the audio level for channel 1 while looking in the viewfinder, by using the AUDIO LEVEL CH-1 control on the front of the viewfinder.



Channel 1 audio level adjustment from the front

- 1** Set the AUDIO SELECT CH-1 switch to MAN.
- 2** Turn the AUDIO LEVEL CH-1 control on the side panel fully clockwise.
- 3** Set the AUDIO IND switch to ON.
The audio level indication will appear in the viewfinder.
- 4** Turn the AUDIO LEVEL CH-1 control on the front until the colon at the right end of the audio level display comes on when the sound input is maximum.



5-3 Adjusting the Audio Level (Continued)

If you cannot set the optimum level

The maximum attenuation range of the front AUDIO LEVEL CH-1 control is about 20 dB. If you cannot set the level within this range, use the AUDIO LEVEL CH-1 control on the side panel.

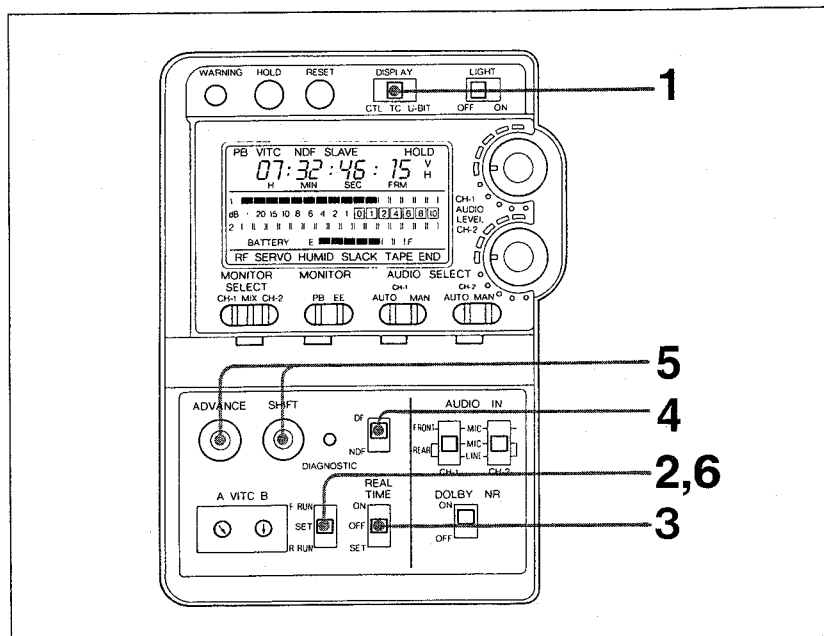
Using the front and side AUDIO LEVEL CH-1 controls

The recommended method of using these two controls, is to leave the front control turned fully clockwise, and adjust the recording level with the side control. Then if the sound input level increases suddenly during recording, use the front control to reduce the level.

5-4 Setting Time Data

5-4-1 Setting the Time Code

If you are using both the time code and the user bits, do the user bit settings first. If you set the time code first, the time code generator stops while the user bit settings are done, so the time code will not be correct. The time code setting range is from 00:00:00:00 to 23:59:59:29 (for BVW-400A) or to 23:59:59:24 (for BVW-400AP).



Setting the time code

- 1** Set the DISPLAY switch to TC.
- 2** Set the F-RUN/R-RUN switch to SET.
- 3** Set the REAL TIME switch to ON or OFF.
- 4** If you are using the BVW-400A, set the DF/NDF switch.
DF: Drop frame mode
NDF: Non-drop frame mode
- 5** Set the time code, using the SHIFT and ADVANCE buttons.
SHIFT button: Selects digit to set. Each time you press it, the flashing column moves one to the right.
ADVANCE button: Increments the flashing digit.
- 6** Set the F-RUN/R-RUN switch to F-RUN or R-RUN.
F-RUN: Free run—time code constantly advancing.
R-RUN: Record run—time code stops except when recording.

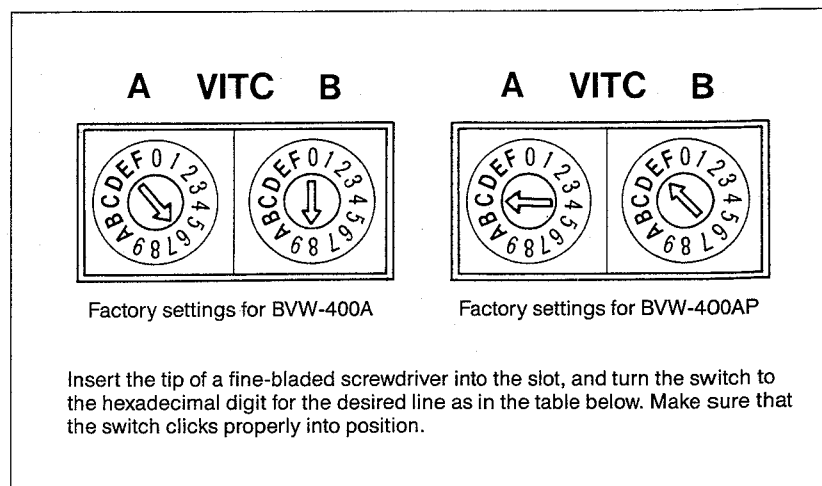
What happens to the time code when the battery is changed?

When you change batteries, a back-up function ensures that the time code generator keeps running (for about 5 years).

5-4 Setting Time Data (Continued)

Selecting the lines to insert the VITC

There are two independent VITC switches, A and B, which allow you to select two different lines in which to record the time code.



VITC switches

VITC recording lines selectable with VITC switches

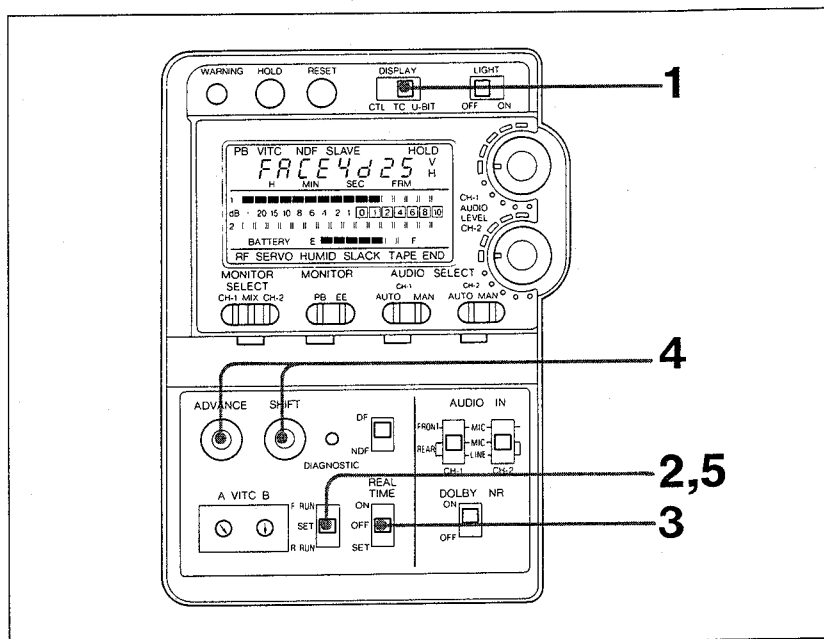
VITC recording line number (BVW-400A)	Switch position	VITC recording line number (BVW-400AP)
10	0 or 1	7
12	2	9
13	3	10
14	4	11
15	5	12
16	6	13
17	7	17
18	8	15
19	9	16
20	A	17
21	B	18
22	C	19
23	D	20
24	E	21
25	F	22

Note

Select a line for the VITC recording that is not already being used for Vertical Interval Test Signal (VITS), Vertical Interval Reference Signal (VIRS) or Vertical Interval Sub-Carrier (VISC).

5-4-2 Setting User Bits

By setting the user bits (up to 8 digits in hexadecimal), you can record user information such as the date, time or scene number, on the time code track.



Setting user bits

- 1** Set the **DISPLAY** switch to **U-BIT**.
- 2** Set the **F-RUN/R-RUN** switch to **SET**.
- 3** Set the **REAL TIME** switch to **OFF**.
- 4** Set the user bits, using the **SHIFT** and **ADVANCE** buttons.
SHIFT button: Selects digit to set. Each time you press it, the flashing column moves one to the right.
ADVANCE button: Increments the flashing digit.

Hexadecimal digits A to F are displayed as follows:

Hexadecimal	A	B	C	D	E	F
Display	<i>A</i>	<i>b</i>	<i>C</i>	<i>d</i>	<i>E</i>	<i>F</i>

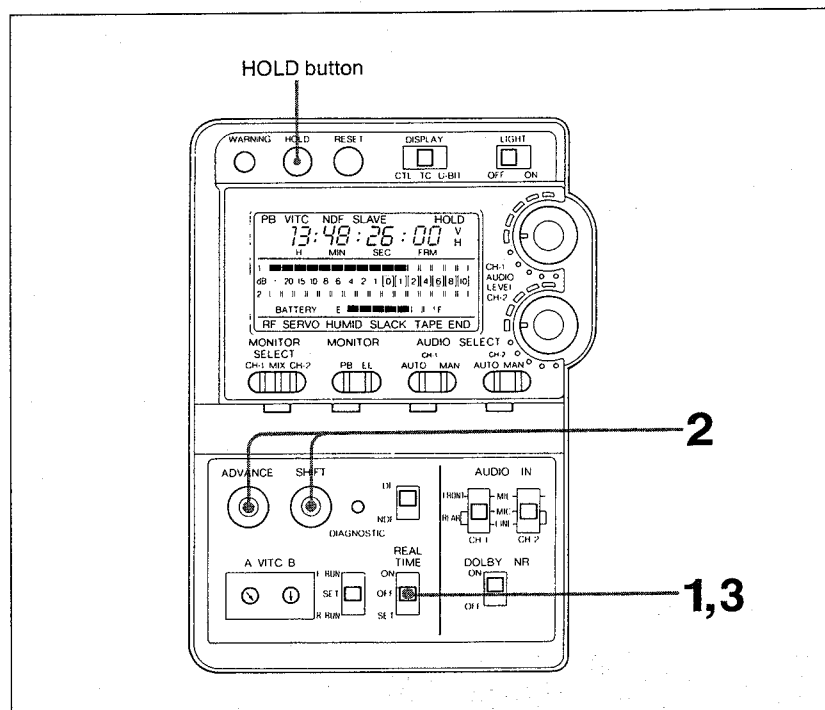
- 5** Set the **F-RUN/R-RUN** switch to **F-RUN** or **R-RUN**.
The specified user bits will be recorded in **LTC** and **VITC**.

5-4 Setting Time Data (Continued)

User bit retention in memory

The user bit setting (apart from the real time) is retained in memory when the power is turned off. Note, though, that the value will not be retained if less than 20 seconds has elapsed from the time you turn the power on to the time you turn it off after making the setting.

5-4-3 Saving the Real Time in VITC



Saving the real time in VITC

- 1** Set the REAL TIME switch to SET.
- 2** Set the real time, using the SHIFT and ADVANCE buttons.
- 3** Set the REAL TIME switch to ON.

The real time will be recorded in VITC, and the user bits in LTC.

By changing an internal setting, you can arrange that the real time is recorded in LTC, and the user bits in VITC.

Refer to the maintenance manual for further details.

To display the real time held in VITC

Set the display switch to U-BIT, and hold down the HOLD button.

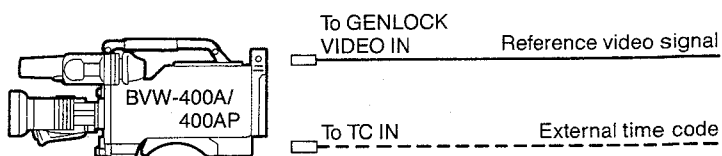
5-4 Setting Time Data (Continued)

5-4-4 Locking the Time Code

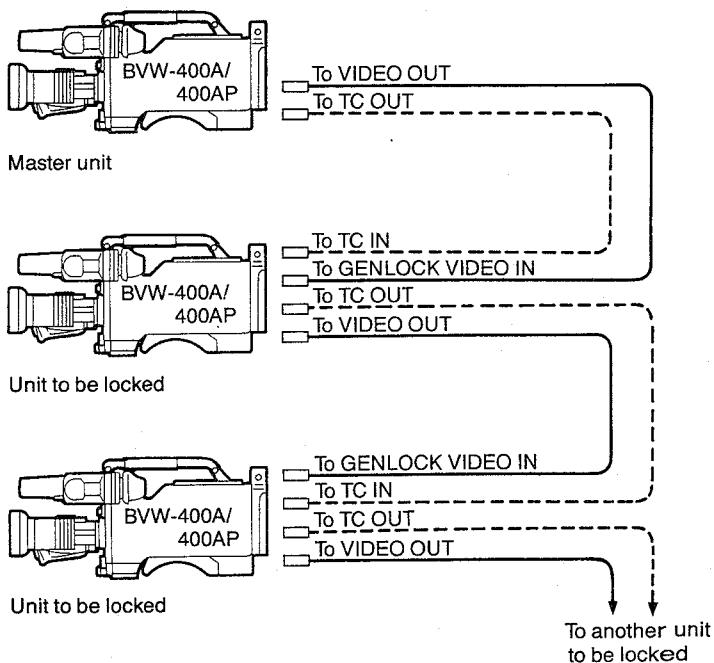
You can lock the internal time code generator of this unit to an external generator for regeneration of external time code. Also, you can lock the time code generators of external VTRs to the internal generator of this unit.

Connections for time code lock

Example 1 Locking to an external time code

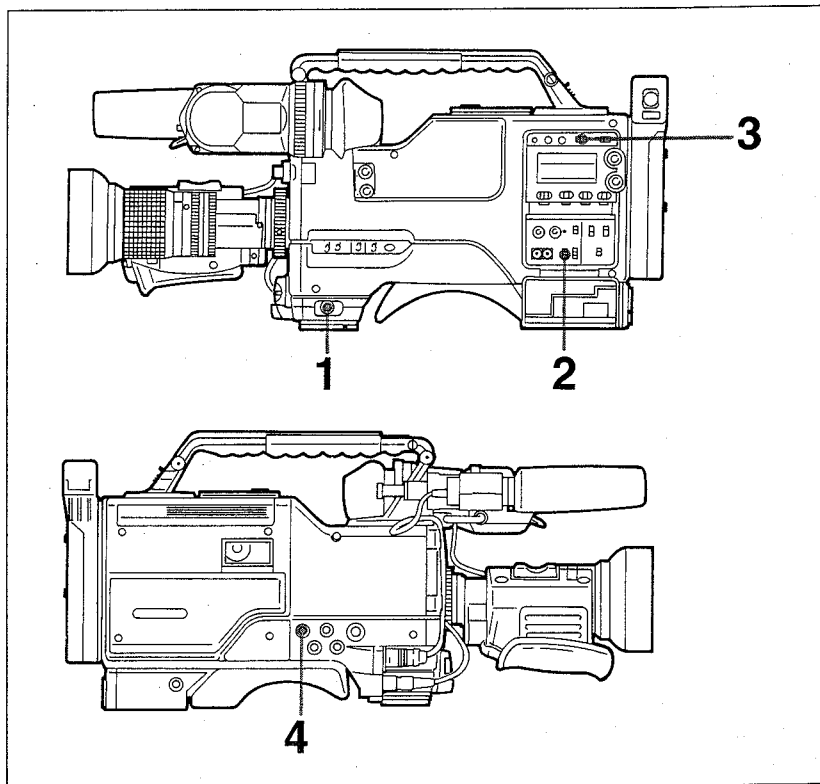


Example 2 Interconnecting a number of BVW-400A/400AP units for time code locking



Note that if you lock the master unit to an external time code, all the connected units will be locked to the same time code.

Procedure for time code lock



Locking the time code

- 1** Turn the POWER switch on.
- 2** Set the F-RUN/R-RUN switch to F-RUN.
- 3** Set the DISPLAY switch to TC.
- 4** Supply time code and reference video signals which comply with the SMPTE (for BVW-400A) or EBU (for BVW-400AP), time code standard, and are in the proper phase relationship.

This operation locks the internal time code generator to the external time code. Once about 10 seconds have elapsed after locking, you can disconnect the external time code without losing the lock. However, if you remove the connector during recording, the lock will be disrupted.

Note

When you finish the above procedure, the time code is immediately locked to the external time code, and the counter display will show the value of the external time code, but it is best to delay recording for a few seconds until the sync generator stabilizes.

5-4 Setting Time Data (Continued)

User bit settings during time code lock

When the time code is locked, only the time data is locked to the external time code value. Therefore, the user bits will have their own settings for each of the units.

You can also lock the user bits to external user bit data.

Refer to the maintenance manual for details.

Releasing the time code lock

First disconnect the external time code, then set the F-RUN/R-RUN switch to R-RUN.

Changing the power supply from the battery pack to an external power supply during time code lock

To maintain a continuous power supply, connect the external supply to the DC IN connector before removing the battery pack. You may lose time code lock if you remove the battery pack first.

Camera synchronization during time code lock

During time code lock, the camera is genlocked to the reference video signal.

Chapter 6

Recording and Playback

This chapter first describes how to load cassettes, and the basic operations required to record. It then discusses quick methods of reviewing the recording and the connections needed to play back the recording on a monitor.

6-1	About Cassettes	6-3
6-1-1	Loading and Unloading Cassettes	6-3
6-1-2	Preventing Accidental Erasure.....	6-5
6-2	Recording	6-6
6-2-1	Basic Procedure.....	6-6
6-2-2	Continuous Recording	6-10
6-3	Playback—Checking the Recording	6-12
6-3-1	Recording Review	6-13
6-3-2	Color Playback	6-13

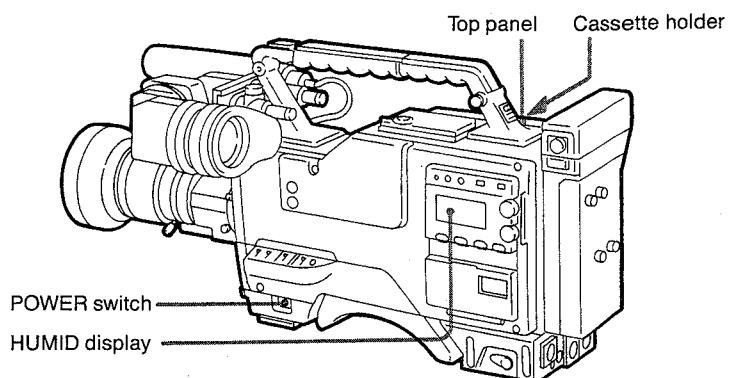
6-1 About Cassettes

See "Specifications" (page A-5) for details of the cassettes you can use in this unit.

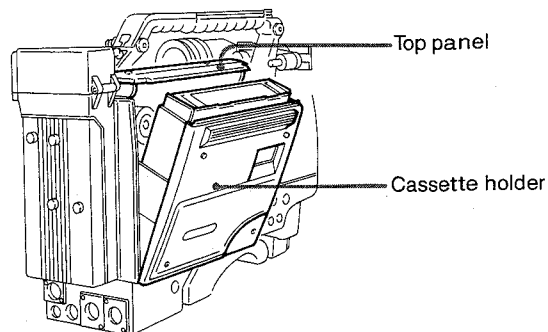
6-1-1 Loading and Unloading Cassettes

Loading

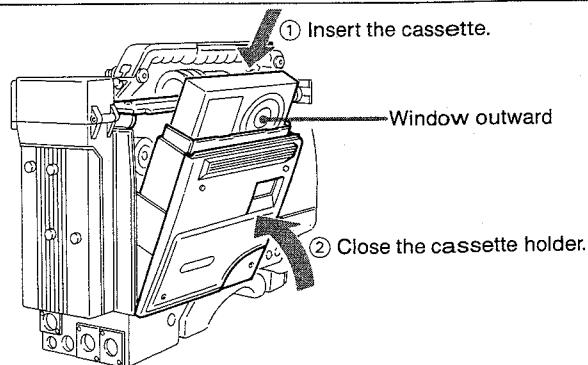
- 1 Check that there is nothing obstructive such as cables around the top panel and cassette holder, then turn the POWER switch on.



- 2 Press the EJECT button.
The top panel will rise, and the cassette holder will open.

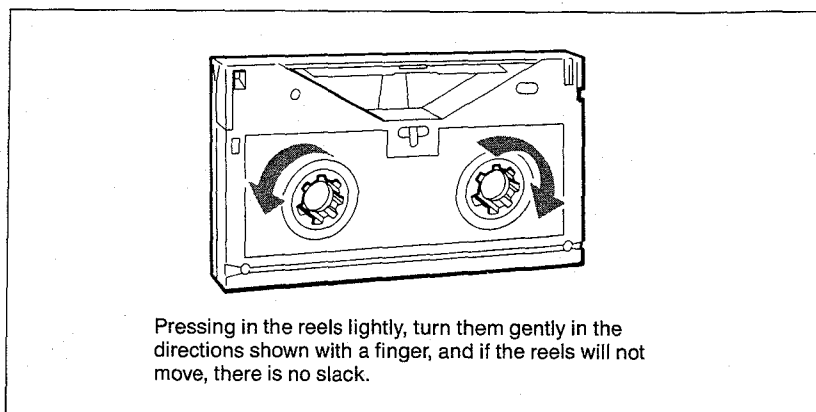


- 3 Check that there is no slack in the tape (*see next page*), then insert the cassette and close the cassette holder.
The top panel will go down.



6-1 About Cassettes (Continued)

Checking the tape for slack



Checking the tape for slack

Unloading

With the power supply on, press the EJECT button to open the cassette holder, then take out the cassette. If you are not immediately going to insert another cassette, close the cassette holder while the power is still on.

Note

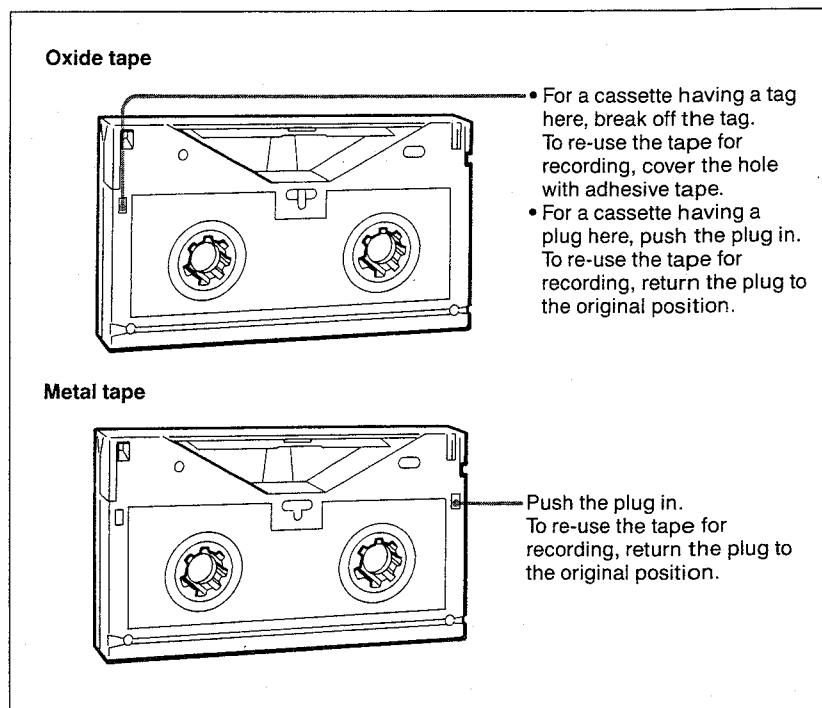
If the POWER switch is set to OFF, or you have removed the battery pack, even when you close the cassette holder, the top panel will not go down. If you put the unit in the carrying case or carry it with the top panel up, the VTR section may be damaged. Therefore turn the power on to lower the top panel.

Unloading the cassette when the battery is exhausted

It is still possible to remove the cassette and close the cassette holder. These operations are not possible if the battery voltage drops below about 9 V. It is best not to do this repeatedly, however.

6-1-2 Preventing Accidental Erasure

The following procedures prevent the cassette tape from being re-recorded inadvertently.



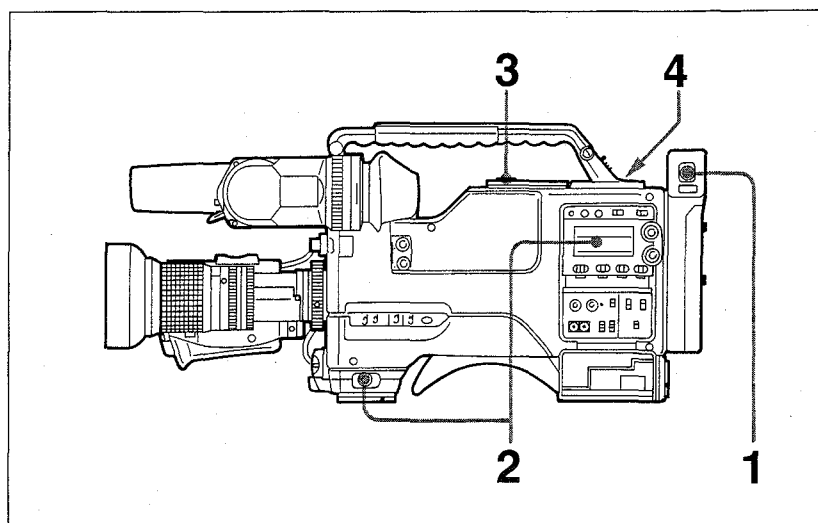
Preventing accidental erasure

6-2 Recording

6-2-1 Basic Procedure

This section describes the basic procedure for shooting and recording. Before a shooting session, carry out the checks listed in the section “Testing the Unit before Shooting” (page A-13) to ensure the unit is functioning properly.

Powering on and loading a cassette



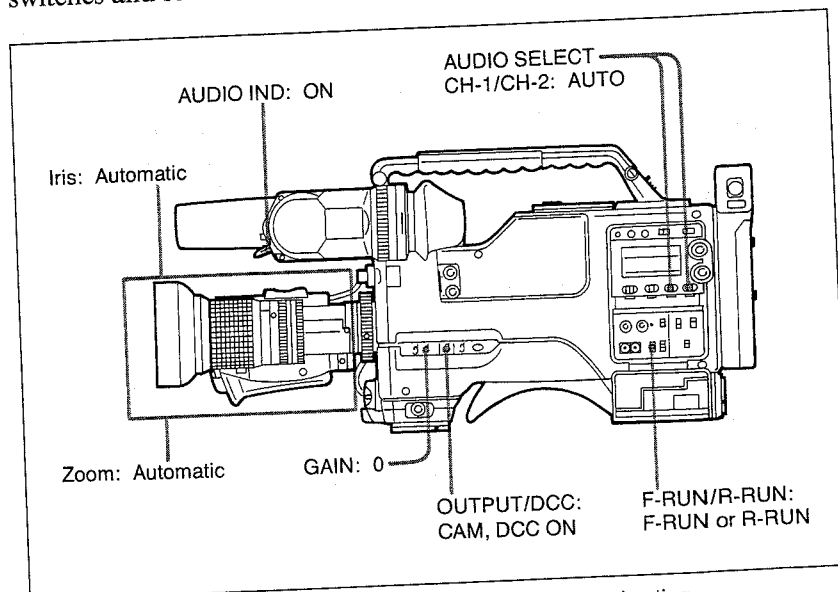
Basic procedure for shooting: from power supply to cassette loading.

- 1** Load a fully charged battery pack.
- 2** Set the POWER switch to ON, and check that the HUMID warning has not appeared and that the BATTERY indicator has at least 5 segments on.
 - If the HUMID warning has appeared, wait until it disappears.
 - If the BATTERY indicator does not have at least 5 segments on, replace the battery pack with a fully charged one.
- 3** Check that there are no cables or anything else obstructing the cassette holder or top panel, then press the EJECT button to open the cassette holder.
- 4** Load the cassette, after checking the points below, then close the cassette holder.
 - The cassette is not set to inhibit recording.
 - There is no slack in the tape.

Adjusting black balance and white balance to stopping recording

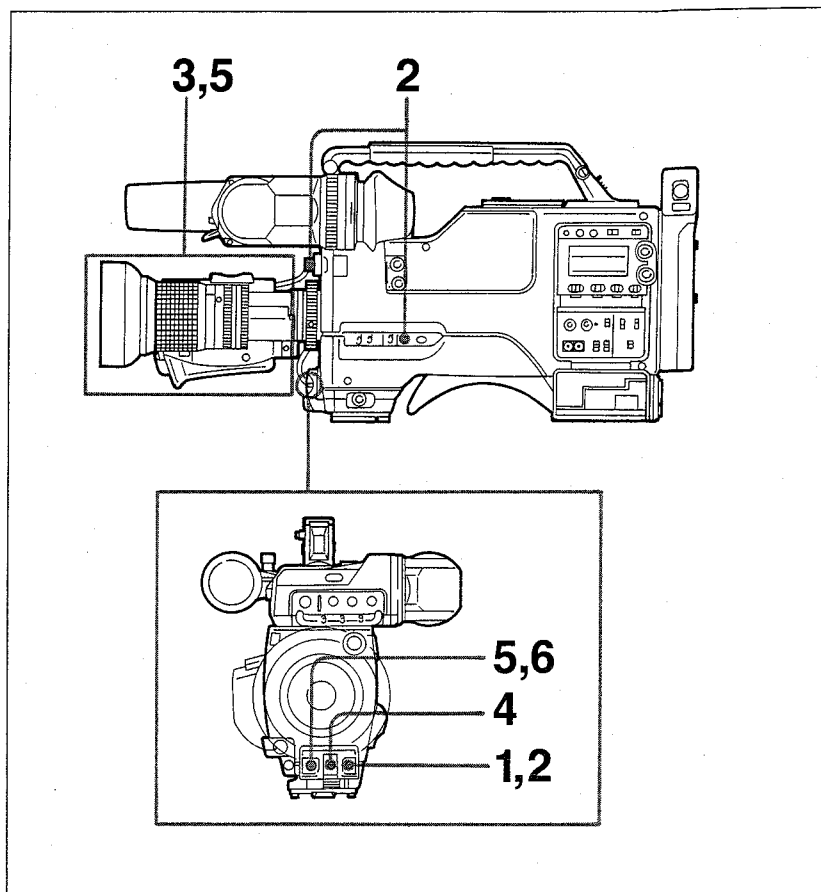
Setting the switches and selectors

After turning the power supply on and loading a cassette, set the switches and selectors as below and begin operations.



Switch and selector settings before beginning shooting

Shooting



Basic procedure for shooting: from adjusting the black balance and white balance to stopping recording

- 1** Push the AUTO W/B BAL switch to BLK to adjust the black balance.
- 2** Select the filter to match the lighting conditions, and adjust the white balance.

When the black balance and white balance settings are already in memory:

Set the WHITE BAL selector to A or B.

When the black balance and white balance settings are not already in memory and there is not enough time to adjust the white balance:

Set the WHITE BAL selector to PRST, and set the FILTER selector to position 1 to get the factory-preset white balance for 3200 K or any other position for 5600 K.

For details, see Section 5-1-2 "Adjusting the White Balance" (page 5-6).

3 Aim the camera, and adjust the focus and zoom.

4 If necessary, set the electronic shutter for an appropriate speed/operation mode.

For details see Section 5-2 "Setting the Electronic Shutter" (page 5-10).

5 Press the VTR START button or the VTR button on the lens, to start recording.

During recording the REC lamp in the viewfinder will light.
Perform zooming and shutter control, if necessary.

6 To stop recording, press the VTR START button again.

The REC lamp goes off.

Tape control buttons

During recording, the tape control buttons (EJECT, REW, F FWD, PLAY, STOP) have no effect.

6-2 Recording (Continued)

6-2-2 Continuous Recording

If you are in the recording pause mode, then simply pressing VTR START or the lens VTR button continues recording at exactly the next frame.

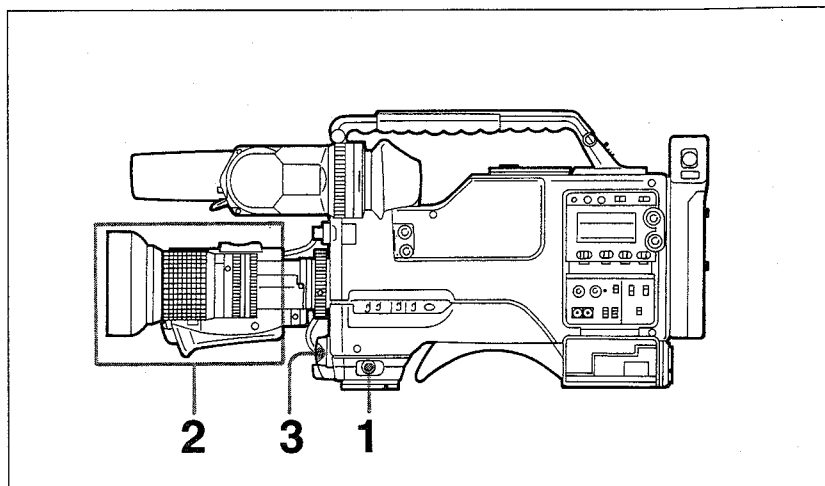
In other cases, you will first need to position the tape at the appropriate point.

When you are in the recording pause mode

Pressing the VTR START button (or VTR button on the lens) makes the unit continue recording from the correct frame, but the time taken before recording starts depends on the VTR SAVE/ST.BY switch settings.

- If the VTR SAVE/ST.BY switch is in the SAVE position, it always takes about four seconds before recording starts.
- In the ST.BY position, recording starts immediately. However, just after changing the switch position from SAVE to ST.BY, it takes about four seconds before recording starts.

If you turn the power off during a recording pause



Continuous recording after turning the power off during a recording pause

1 Turn the power on again.

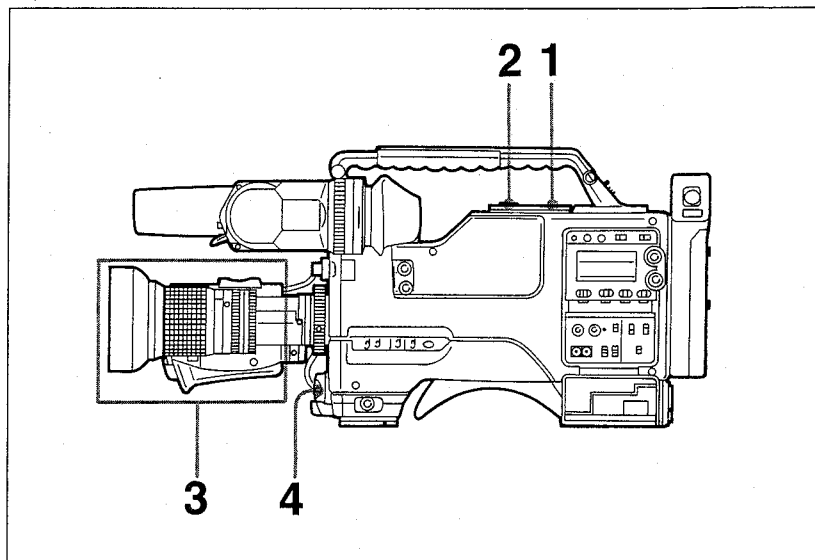
2 Press the RET button on the lens.

The unit will position the tape at the correct point. This function does not work, however, unless the continuous recording period was at least 4 seconds.

3 Press the VTR START button or the lens VTR button to begin recording.

Continuous recording in other cases

After rewinding or fast forwarding the tape, after removing the cassette, or on a tape which has been part recorded, you can obtain continuous recording in the following procedure.



Continuous recording after rewinding or fast forwarding the tape, after removing the cassette, or on a tape part recorded

- 1** Looking in the viewfinder, press the PLAY button to start playback.
- 2** At the point you want to continue recording, press the STOP button. To continue from the end of recording on the tape, press the STOP button immediately after the end of the recording (within 0.5 seconds).
- 3** Press the lens RET button.
The tape will rewind, and be positioned at the correct point for continuous recording.
- 4** Press the VTR START button or the lens VTR button to start recording.

6-3 Playback—Checking the Recording

By pressing the PLAY button you can review the recording in black and white in the viewfinder. There are two other ways of reviewing:

- Recording review: The viewfinder shows the last two seconds recorded, in black and white.
- Color playback: By connecting a VA-500/500P playback adaptor, you can play back the recording in color.

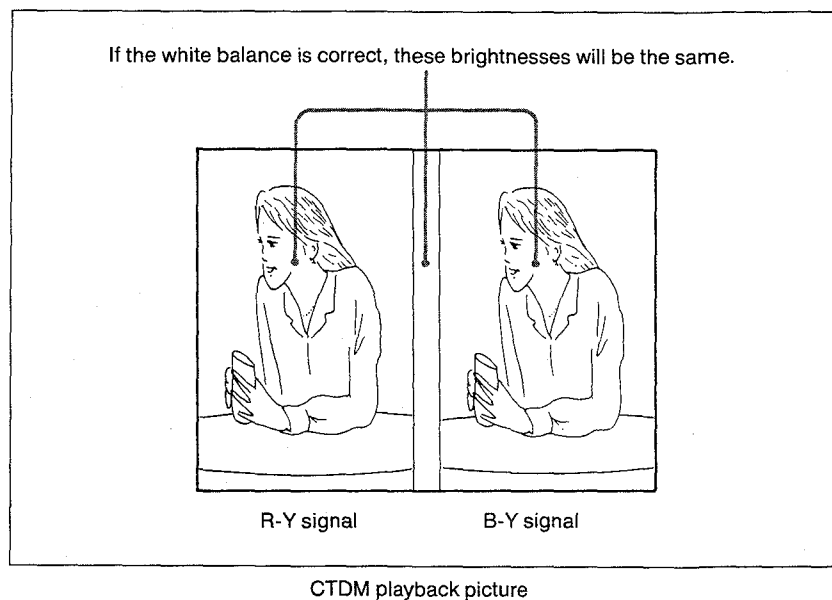
Even during rewinding or fast forward, the playback signal goes to the viewfinder and to the VA-500/500P playback adaptor, but the picture will be distorted.

For selection of the audio output signal and audio level adjustment, use the switches and controls described on pages 2-5 to 2-9.

Checking the chrominance signal in the viewfinder during playback

Press the CTDM button.

While the button is depressed the CTDM playback picture appears in the viewfinder and you can check color balance.



6-3-1 Recording Review

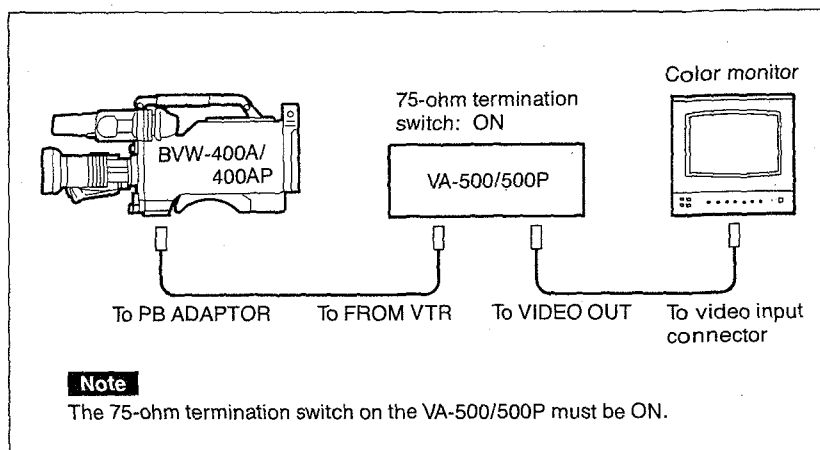
After stopping recording (or, during a recording pause), if you press the lens RET button the tape automatically rewinds the last two seconds, and the playback picture of that portion appears in the viewfinder. In this way you can check the recording. If you hold the RET button down, the last 10 seconds rewind and play back. At the end of the review the unit returns to the recording pause mode.

Notes

- The recording review function will not work unless the recording which you have made is of at least one second duration.
- With a VA-500/500P playback adaptor connected, during the recording review, the picture and sound output to the playback adaptor is in E-E mode.

6-3-2 Color Playback

Connect a VA-500/500P playback adaptor to the unit, and a color monitor to the playback adaptor, and press the PLAY button.



Color playback

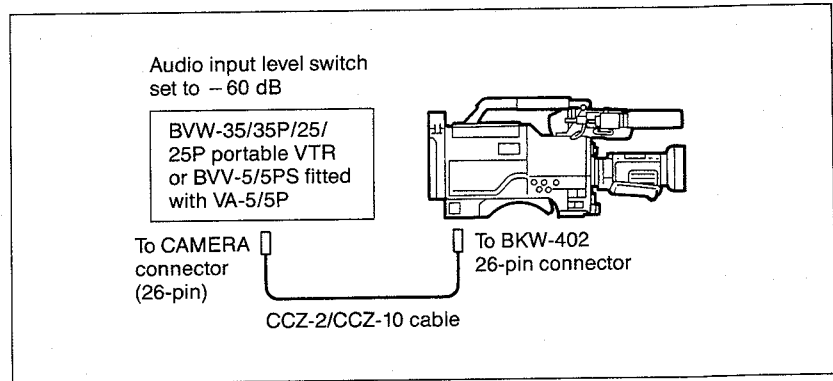
Note

This unit does not output a playback signal to a monitor connected to the side or rear VIDEO OUT connector even if you press the PLAY button.

7-2 Simultaneous Recording on External and Internal VTRs

Connections

Fit a BKW-402 VTR connector unit to the BVW-400A/400AP, and connect the external VTR to the BKW-402 26-pin connector, using a CCZ-2/CCZ-10 cable. Set the audio input level switch on the external VTR to -60 dB.



Connecting an external VTR to the 26-pin interface

Internal switch settings

The setting of the internal switches on the IF-298A board which control the 26-pin interface must be as below. These are all the factory settings, so in general no change is necessary.

VTR MODE: PARALLEL

EXT VTR INDEPENDENT: OFF

26P INTERFACE: OFF

Recording

Put the external VTR in the recording pause mode, by operating its own controls, then press the VTR START button or the lens VTR button on the BVW-400A/400AP. The external and internal VTRs will start recording simultaneously. When you press the button again, both VTRs go into the recording pause mode.

If either VTR comes to end of tape during recording

Even if one VTR stops at the end of tape, the other will continue recording.

Restarting simultaneous recording

- When the internal VTR has run out of tape, change the cassette, and press the VTR START button or lens VTR button. The external VTR will continue recording through this interval.
- When the external VTR has run out of tape, change the cassette, and restart recording with the controls on the external VTR. The internal VTR will continue recording through this interval.

Caution

If you press the VTR START button or lens VTR button after changing the cassette on the external VTR, the internal VTR will go into the recording pause mode.

VTR SAVE/ST.BY switch

The VTR SAVE/ST.BY switch on the BVW-400A/400AP also switches the external VTR between power saving and standby modes.

- When the VTR SAVE/ST.BY switch is in the ST.BY position and you start recording, both internal and external VTRs start operating immediately, and almost simultaneously.
- When the VTR SAVE/ST.BY switch is in the SAVE position and you press the VTR START button or lens VTR button, the internal VTR will start recording after a few seconds, and the external VTR will start a few seconds after that.

Tape transport modes

The STOP, REW and F FWD buttons on the BVW-400A/400AP control the tape transport functions of the internal VTR, but put the external VTR in the recording pause mode if it is recording.

Using the viewfinder for playback

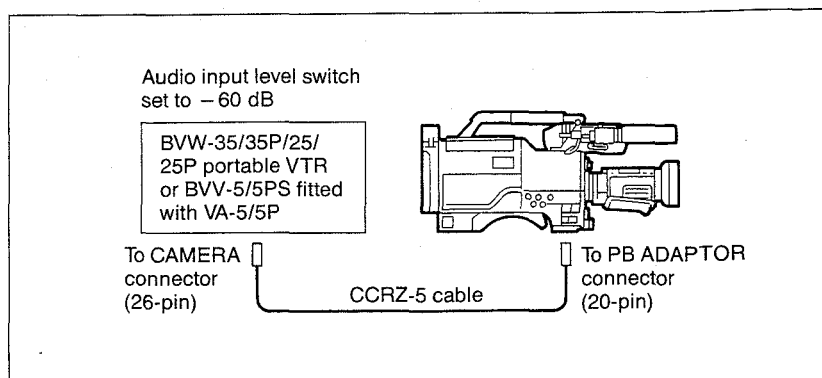
Pressing the PLAY button on the BVW-400A/400AP allows you to see the recording played back in black and white in the viewfinder.

7-3 Recording on an External VTR Only (Continued)

7-3-2 Using the 20-pin Interface

Connections

Connect the external VTR to the PB ADAPTOR connector using a CCRZ-5 20-pin/26-pin cable (not supplied). Set the external VTR audio input level switch to -60 dB.



Connecting an external VTR to the 20-pin interface

External VTR power on

When the external VTR is powered on, the internal VTR enters the power saving mode, becoming unable to operate; you can operate the external VTR only.

Recording

Press the VTR START button or lens VTR button. The external VTR starts recording. Press again to return to the recording pause mode.

Using the viewfinder for playback






















After pressing the PLAY button on the external VTR, press the lens RET button. While it is held down, the playback picture appears in black and white in the viewfinder.
The recording review function is not available, however.

Appendix

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Operation Warnings (Continued)

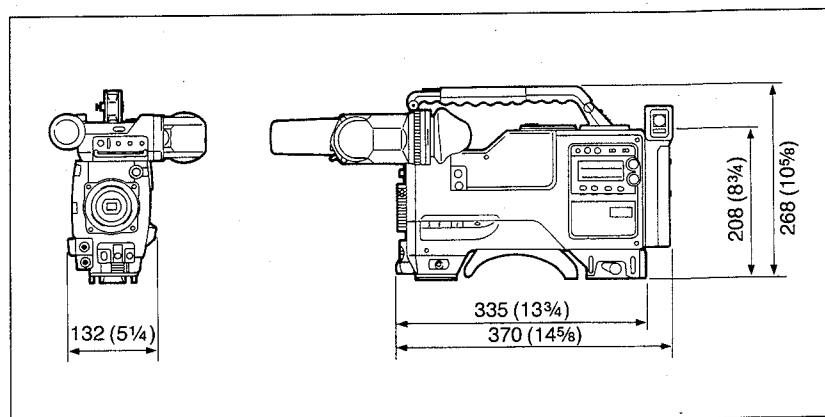
Operation warnings

Warning indication	Display panel	Lamps		Warning sound	Problem	VTR action	Corrective action
		Flashing/continuous	REC/Tally				
RF	a) Continuous			● ● ● ● ● ● ● ● : 4 beeps/sec. ● ● ● ● ● ● ● ● : 1 beep/sec. ● ● ● ● ● ● ● ● : Continuous beep	Video head gap clogged or problem in recording circuit.	After detecting head clogging, recording continues but is substandard.	Clean the heads. If recording is still substandard, turn the power off and consult your Sony representative.
				a) ● ● ● ● ● ● ● ●	Servo lock lost.	Recording continues but is substandard.	Turn the power off and consult your Sony representative. Note that this indication may be given momentarily when the tape starts moving, but this does not indicate a problem.
SERVO	Continuous			● ● ● ● ● ● ● ●			Turn the power off and consult your Sony representative.
	Continuous			● ● ● ● ● ● ● ●	Interface error between the system CPU and servo CPU.	VTR stops.	Turn the power off and consult your Sony representative.
HUMID	Continuous			a) ● ● ● ● ● ● ● ● b) ● ● ● ● ● ● ● ●	Condensation on the head drum.	Recording continues, but stops if the tape sticks to the head drum. Playback, fast forward or rewind stops.	Stop the tape, and wait until the HUMID indication disappears.
	Continuous			● ● ● ● ● ● ● ●	The tape cannot be wound properly.	VTR stops. An error code appears in the counter display section of the display panel. Look up the error code in the maintenance manual.	By the method described in the maintenance manual or keeping the EJECT button depressed for about 10 seconds, remove the cassette and close the cassette holder without cassette reloading. After the top panel goes down, turn the power off and consult your Sony representative.
TAPE END	Flashing ^{a)}			● ● ● ● ● ● ● ●	Close to the end of tape.	Operation continues.	Change the cassette, if necessary.
	Continuous			● ● ● ● ● ● ● ●	End of tape.	Record, playback or fast forward stops.	Change the cassette or rewind the tape.
BATTERY	Flashing			● ● ● ● ● ● ● ● a)	Battery close to exhausted.	Operation continues.	Change the cassette, if necessary.
BATTERY E	Flashing			● ● ● ● ● ● ● ●	Battery exhausted.	Operation stops.	Change the battery.
(No indication given on the display panel)					Interface error between the system CPU and time code CPU.	Recording continues, but some operations, such as recording review and cuing do not work. If another problem occurs simultaneously, its indication is given priority.	Turn the power off and consult your Sony representative.

a) During recording b) During playback, fast forward or rewind

Specifications

Power voltage	12 $\pm_{1.0}^{5.0}$ V DC
Power consumption	22 W (12 V supply, using metal tape)
Operating temperature	0°C to 40°C (32°F to 104°F)
Operating humidity	Max. 85% relative humidity
Storage temperature	-20°C to +60°C (-4°F to +140°F)
Operating weight	Approximately 7.0 kg (15 lb 7 oz)



Dimensions in mm (inches)

Specifications (Continued)

Video (with standard playback machine)

BVW-400A

	Metal tape	Oxide tape
Bandwidth Luminance	30 Hz to 4.5 MHz $\begin{smallmatrix} +0.5 \\ -3.0 \end{smallmatrix}$ dB	30 Hz to 4.1 MHz $\begin{smallmatrix} +0.5 \\ -6.0 \end{smallmatrix}$ dB
Chrominance (R-Y, B-Y)	30 Hz to 1.5 MHz $\begin{smallmatrix} +0.5 \\ -3.0 \end{smallmatrix}$ dB	
S/N Luminance (component IN/OUT)	51 dB min	48 dB min
Chrominance (AM, PM)	53 dB min	50 dB min
Differential gain	2% max.	3% max.
Differential phase	2° max.	3° max.
K-factor (2T pulse)	2% max.	3% max.
Y/C delay	20 ns max.	

BVW-400AP

	Metal tape	Oxide tape
Bandwidth Luminance (50% modulation)	25 Hz to 5.5 MHz $\begin{smallmatrix} +0.5 \\ -3.0 \end{smallmatrix}$ dB	25 Hz to 4.0 MHz $\begin{smallmatrix} +0.5 \\ -6.0 \end{smallmatrix}$ dB
Chrominance (50% modulation)	30 Hz to 1.5 MHz $\begin{smallmatrix} +0.5 \\ -3.0 \end{smallmatrix}$ dB	
S/N Luminance (component IN/OUT ^a)	48 dB min	46 dB min
Color difference	48 dB min	45 dB min
Y/C delay	20 ns max.	
Pulse shape distortion (K-pulse, 2T)	2% max.	3% max.

a) The input/output levels of the component signals conform to the EBU "N-10" standard.

Audio (with standard playback machine)

BVW-400A

Recording on longitudinal tracks

	Metal tape	Oxide tape
Frequency response	50 Hz to 15 kHz $+1.5$ -3.0 dB	50 Hz to 15 kHz $+3.0$ -3.0 dB
S/N (at 3% distortion)	72 dB min	50 dB min (with DOLBY NR off)
Distortion (at 1 kHz)	1.5% max.	2% max.
Crosstalk (at 1 kHz)	- 55 dB max.	
Wow and flutter	Less than 0.15% rms	

AFM recording (metal tape)

Frequency response	20 Hz to 20 kHz $+0.5$ -2.0 dB
Dynamic range	80 dB min
Distortion (at 1 kHz)	0.5% max.
Crosstalk (at 1 kHz)	- 65 dB max.

BVW-400AP

Recording on longitudinal tracks

	Metal tape	Oxide tape
Frequency response (at 20 dB below peak level ^{a)})	50 Hz to 15 kHz $+1.5$ -3.0 dB	50 Hz to 15 kHz $+3.0$ -3.0 dB
S/N (at peak level ^{a)} , weighted CCIR 468-3)	62 dB min	58 dB min (with DOLBY NR on)
Distortion (at 1 kHz) at peak level ^{a)}	3% max.	
at operational level (+ 4 dBm)	1.5% max.	2% max.
Crosstalk (at 1 kHz)	- 55 dB max.	
Wow and flutter (DIN 45507)	Less than 0.15% rms	

a) Peak level: + 8 VU

AFM recording (metal tape)

Frequency response (at 20 dB below peak level ^{a)})	20 Hz to 20 kHz $+0.5$ -2.0 dB
S/N (at peak level ^{a)} , weighted CCIR 468-3)	68 dB min
Distortion (at 1 kHz) at peak level ^{a)}	3% max.
at operational level (+ 4 dBm)	0.6% max.
Crosstalk (at 1 kHz)	- 65 dB max.

a) Peak level: + 19 VU

Specifications (Continued)

Input/output connectors

Signal inputs

AUDIO IN CH-1, CH-2 (XLR, 3-pin, female)	– 60 dBu/ + 4 dBu ¹⁾ for BVW-400A, or – 60 dBs/ + 4 dBs ²⁾ for BVW-400AP, with/without phantom power supply (selectable, 48 V DC, maximum current 3 mA)
MIC IN (XLR, 3-pin, female)	– 60 dBu ¹⁾ for BVW-400A, or – 60 dBs for BVW-400AP, with phantom power supply (48 V DC, maximum current 3 mA)
GENLOCK VIDEO IN (BNC)	1.0 Vp-p, 75 ohms
TC IN (BNC)	0.5 V to 18 Vp-p, 10 kilohms

Signal outputs

VIDEO OUT (BNC) (rear)	1.0 Vp-p, 75 ohms, unbalanced (internally connected with PB ADAPTOR connector and 26-pin interface)
VIDEO OUT (BNC) (side panel)	1.0 Vp-p, 75 ohms, unbalanced
TC OUT (BNC)	1.0 Vp-p, 75 ohms
PB ADAPTOR (20-pin)	1.0 Vp-p, 75 ohms, unbalanced (internally connected with rear VIDEO OUT connector and 26-pin interface)
EARPHONE (minijack)	8 ohms, $-\infty$ to -18 dBu ¹⁾ (or dBs ²⁾) variable

Others

DC IN (XLR, 4-pin, male)	11 to 17 V DC
DC OUT (4-pin)	11 to 17 V DC, maximum current 0.1 A
LENS (12-pin)	
REMOTE (6-pin)	

1) 0 dBu=0.775 Vrms

2) 0 dBs=0.775 Vrms

Accessories supplied

Microphone (gun-directional, phantom feed type) (1)
Tripod adaptor (VCT-14) (1)
Shoulder strap (1)
Rain cover (1)
Extension board (1)
Carrying case (LC-201) (1) (only supplied with BVW-400AP)
Operation manual (1)
Maintenance manual (1)

Recommended auxiliary equipment

Power supply and related equipment

NP-1B/1A battery pack
BP-90A/90 battery pack
BC-1WB battery charger (for NP-1B/1A)
BC-210/210CE battery charger (for BP-90A/90)
BC-410/410CE battery charger (for NP-1B/1A and BP-90A/90)
DC-500 battery adaptor (to hold a BP-90A/90 pack)
DC-520 battery adaptor (to hold two NP-1B/1A packs)
AC-500/500CE AC adaptor

Video cassette tape

BCT-5M/10M/20M/30M metal tape
BCT-5G/10G/20G/30G oxide tape

Viewfinder and related equipment

BVF-3 3-inch viewfinder
BKW-401 viewfinder rotation bracket
Fog-proof filter (Part No. 1-547-341-11)
Lens assembly (−2.8 D to +2.0 D) (Part No. A-8262-537-A)
Lens assembly (−3.6 D to −0.8 D) (Part No. A-8262-538-A)
Left-eyed shooting viewfinder slide guide (Part No. A-7612-381-A)

Optical filter disk

ND filter (1/8 ND) (Part No. 3-174-685-01)
ND filter (1/32 ND) (Part No. 3-174-683-01)
ND filter (1/64 ND) (Part No. 3-174-684-01)
Cross filter (Part No. 3-174-682-01)

Consult your Sony representative about use of these filters.

(Continued)

Specifications (Continued)

External VTR and related equipment

BVW-35/35P/25/25P portable video cassette recorder
BVV-5/5PS portable video cassette recorder
VA-5/5P VTR adaptor (for BVV-5/5PS portable VTR)
BKW-402 VTR connector unit (for external VTR connection via 26-pin interface)
CCZ-2/10 cable (for external VTR connection via 26-pin interface)
CCRZ-5 cable (for external VTR connection via 20-pin/26-pin interface)

Equipment for playback monitoring and remote control

VA-500/500P playback adaptor
RM-P3 remote control unit

Audio equipment

C-74 microphone
ECM-MS5 stereo microphone
CAC-12 microphone holder
CRS-3P cradle suspension
WRR-27/28L UHF portable tuner
WRT-27 UHF transmitter
BTA-27 UHF portable tuner attachment kit

Equipment for maintenance and easier handling

BCT-5CLN cleaning cassette
LC-201 carrying case¹⁾
CAC-GR01 camera grip
Chest pad assembly (Part No. A-8262-516-A)
LKW-200 cover cloth (for protection against extremely low temperatures)

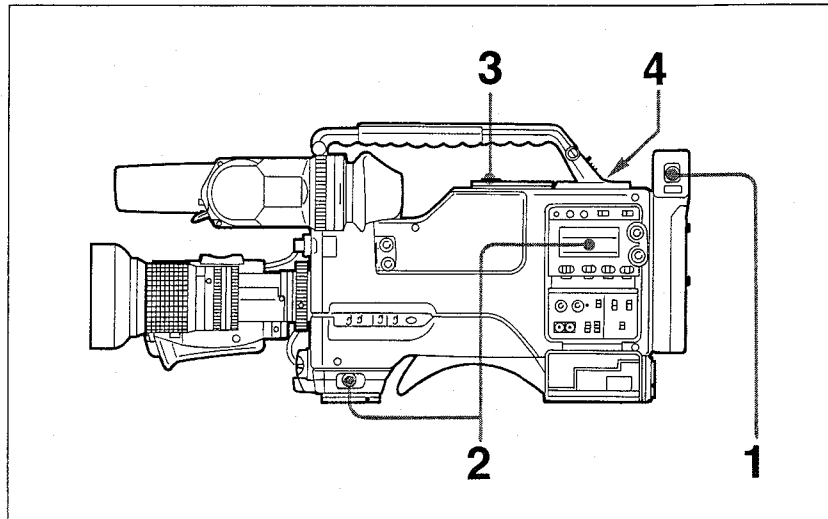
Design and specifications are subject to change without notice.

1) The BVW-400AP is supplied with this carrying case.

Testing the Unit before Shooting

Check the functions of the unit before setting out for a shooting session, preferably checking the unit together with a color monitor.

Preparations for Testing



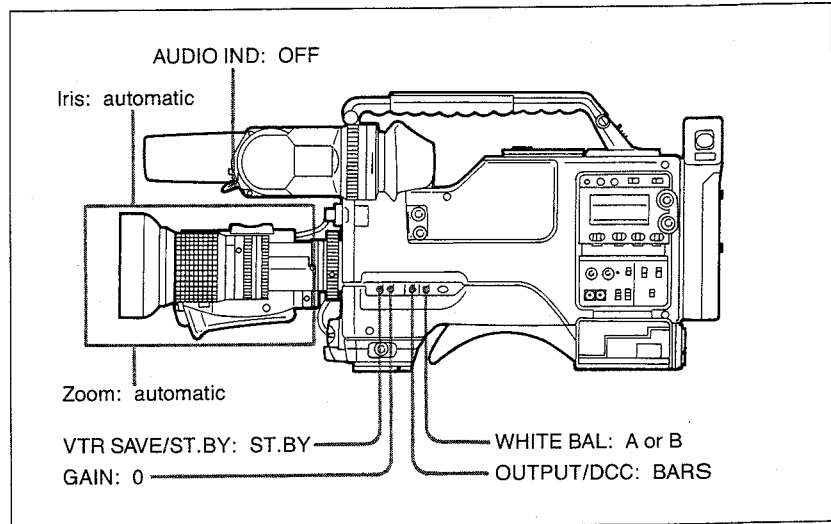
Preparations for testing

- 1** Load a fully charged battery pack.
- 2** Turn the POWER switch on, and check that the HUMID indication does not appear and that the BATTERY indicator shows at least five segments.
 - If the HUMID indication appears, wait until it disappears.
 - If the BATTERY indicator does not show at least five segments, replace the battery pack with a fully charged one.
- 3** Check that there are no cables or anything else obstructing the cassette holder or top panel, then press the EJECT button to open the cassette holder.
- 4** Load the cassette, after checking the points below, then close the cassette holder.
 - The cassette is not set to inhibit recording.
 - There is no slack in the tape.

Testing the Unit before Shooting (Continued)


Testing the Camera

Set the switches and selectors as follows.

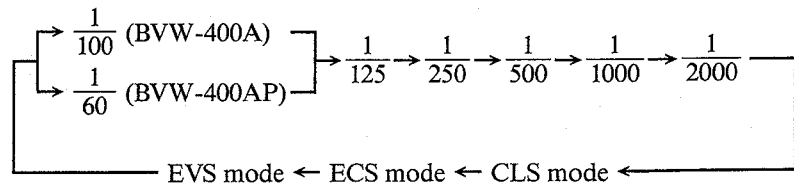


Switch settings for testing

Testing the viewfinder

- 1** Adjust the viewfinder position.
- 2** Check that the color bars are displayed in the viewfinder, and adjust the BRIGHT, CONTRAST and PEAKING controls to give the best color bar display.
- 3** Press the AUTO W/B BAL switch to WHT, and check that the screen display mode changes in the sequence of: 1, 2, 3, 1, ... Normally, set to mode 3.
- 4** Set the OUTPUT/DCC selector to CAM, and change the FILTER selector position in the sequence of: 1, 2, 3, 4. Check that the FILTER indication in the viewfinder shows the correct numbers.
- 5** Set the SHUTTER selector to ON. Check that  lamp in the viewfinder is on and that the current shutter setting is indicated in the screen.





- 6** Push the SHUTTER selector from ON to SEL, and while the colon to the left of the shutter setting indication is on, repeatedly push the selector from ON to SEL. Check that the shutter setting changes in the following sequence:



- 7** Select the shutter setting for CLS mode, and while the colon to the left of the shutter setting indication is on, rotate the Clear Scan control. Check that the value of shutter speed in Hz increases when rotating the Clear Scan control upward and decreases when rotating the control downward. Do the same thing for ECS mode, too.
- 8** Set the SHUTTER selector to OFF, and check that the \textcircled{L} lamp is off.
- 9** Pointing the camera at a suitable subject, focus the camera and check the picture in the viewfinder.
- 10** Set the AUDIO IN CH-1 and CH-2 switches both to FRONT[MIC], and the AUDIO IND switch to ON. Check that when sound is input to a microphone connected to the front MIC IN connector the audio level indication appears in the viewfinder.
- 11** Turning the AUDIO IND switch off, check that the audio level indication in the viewfinder disappears.

Testing the Unit before Shooting (Continued)

Testing the iris and zoom functions

- 1** Set the zoom to automatic, and check that the power zoom functions.
- 2** Set the zoom to manual, and check the zoom functions manually.
- 3** Set the iris to automatic, and point the camera at objects of different brightnesses. Check that the automatic iris adjustment operates correctly.
- 4** Set the iris to manual, and check that turning the iris ring correctly adjusts the iris.
- 5** Hold down the instant auto iris button on the lens, and point the camera at objects of different brightness. Check that the iris ring is turning as the automatic adjustment is made.
- 6** Set the iris back to automatic, and change the GAIN selector to 9 then 18, with the camera pointing at an object of constant brightness. Check that the  lamp in the viewfinder is on and that the iris closes as the gain increases.
- 7** Return the GAIN selector to 0, and check that the  lamp is off.
- 8** If an extender mechanism is incorporated in your lens, put it into an operative position and check the effect. Also, check that the  lamp in the viewfinder is on.
- 9** Put the lens extender back into inoperative position, and check that the  lamp is off.

Testing the VTR

Carry out tests (1) to (5) consecutively in the order given.

(1) Testing the tape transport functions

- 1** Set the VTR SAVE/ST.BY switch to SAVE, and check that the VTR SAVE lamp in the viewfinder is on.
- 2** Set the VTR SAVE/ST.BY switch to ST.BY, and check that the VTR SAVE lamp is off.
- 3** Set the F-RUN/R-RUN switch to R-RUN.
- 4** Set the DISPLAY switch to CTL.
- 5** Press the VTR START button, and check the following:
 - The tape reels are rotating.
 - The counter indication is changing.
 - The REC lamp in the viewfinder is on.
 - The RF and SERVO indications in the display panel are off.
- 6** Press the VTR START button again. Check that the tape stops, and the REC lamp in the viewfinder goes off.
- 7** Repeat the checks of Step **5** and **6**, this time using the VTR button on the lens.
- 8** Press the RESET button. Check that the counter display goes to "00:00:00:00".
- 9** Turn the LIGHT switch on, and check that the display panel is illuminated.
- 10** Hold the REW button down, and rewind the tape for a while, then press the PLAY button. Check that the rewind, record and playback functions are all operating normally.
- 11** Press the F FWD button, and check that the tape fast forward function works.

Testing the Unit before Shooting (Continued)

(7) Checking the functioning of the time code and user bits

- 1** Set the user bits as required.
On how to set, see Section 5-4-2 "Setting User Bits" (page 5-19).
- 2** Set the time code.
On how to set, see Section 5-4-1 "Setting the Time Code" (page 5-17).
- 3** Set the F-RUN/R-RUN switch to R-RUN.
- 4** Press the VTR START button. Check that the tape starts and the counter indication in the display panel changes.
- 5** Press the VTR START button again. Check that the tape stops and the counter indication also stops changing.
- 6** Set the F-RUN/R-RUN switch to F-RUN. Check that the counter indication changes regardless of whether the tape is moving.
- 7** Set the DISPLAY switch to U-BIT. Check that the user bit data set is displayed.

Maintenance

Cleaning the Video Heads

To clean the video heads always use a Sony BCT-5CLN cleaning cassette. Follow the instructions with the cleaning cassette carefully, as incorrect or excessive use could damage the video heads.

Cleaning the Viewfinder

- Use a dust blower to clean the CRT screen and mirror inside the barrel.
- Clean the lens and protecting filter with a commercially available lens cleaner.

Caution

Never use organic solvents such as thinners.

Color bar signal

A test signal which can be displayed as vertical bars of different colors on a color video monitor. Used to check chrominance functions of color television and video systems such as cameras and monitors.

Color conversion filter

An optical filter used with color video cameras to convert the color temperature of a light source, usually to a lower value which is the reference color temperature for the camera, so that white balance is also ensured when shooting with the light source in question. *See also* Color temperature and White balance adjustment.

Color temperature

The temperature in Kelvins (K) to represent the color of a light source, determined by heating a perfectly black body until its color matches that of the light source. Color temperature is higher when the color is bluish and lower when reddish.

Component video signal

A signal that consists of a luminance signal (Y) and two chrominance (color difference) signals (R-Y, B-Y).

Composite video signal

A signal that consists of video (luminance and color subcarrier), sync (horizontal and vertical), and color burst signals.

Condensation

Moisture condensation on VTR's tape transport mechanism. If there is condensation on the head drum, tape tends to stick to the drum, resulting in damages to tape and a malfunction of the VTR.

CRT

Cathode-ray tube. Video camera viewfinders are equipped with a CRT image display, so you can monitor what you are shooting.

CTDM

Compressed Time Division Multiplex. A method of processing chrominance signals for recording. When recording component video signals, both of the two chrominance signals (R-Y, B-Y) are time-compressed to half, multiplexed and recorded on a single track one after the other.

CTL

Control signal in the form of regular pulses recorded along a longitudinal track on the videotape. By counting these pulses, it is possible to determine the number of frames, and hence the tape's running time. Used mainly to adjust the tracking position of video heads, and to achieve time code continuity in continuous recording.

DCC

Dynamic Contrast Control. A video camera containing a DCC circuit can handle a wide dynamic range of luminance.

Diopter

A measure of lens power; its unit is the reciprocal of 1 m (3.28 ft). A diopter lens is a simple supplementary lens placed over the main camera lens, to alter its effective focal length.

Drop frame mode

SMPTE time code runs at 30 frames/second, while the NTSC color television system runs at about 29.97 frames/second. This results in that a length of 1 hour as indicated by time code is longer than the actual clock time of 1 hour by 108 frames, or about 3.6 seconds. Drop frame mode adjusts the running of time code to eliminate this discrepancy, by dropping two frames from time code account at the beginning of each minute except every tenth minute. On the other hand, non-drop frame mode does not adjust the discrepancy between time code value and actual time.

EBU

European Broadcasting Union. Established by broadcasting and related organizations in Europe.

E-E mode

Electric-to-Electric mode. When you operate a VTR in E-E mode, input video and/or audio signals pass through electric circuits only and then come out from the output connectors, without passing through electromagnetic conversion circuits such as recording heads. You can use E-E mode to directly check and monitor the input signals without recording them on the tape.

EFP

Electronic field production. The use of electronic equipment such as portable video cameras, VTRs, and sound equipment for television production outside studios. EFP is characterized by generally higher production quality than ENG.

ENG

Electronic news gathering. The use of portable video cameras, VTRs, and sound equipment for the production of daily news stories and short documentaries.

Ff

See Flange focal length.

Field pickup unit

A portable device for transmitting the video and audio signals that are recorded outside a studio to a broadcast station.

R-Y signal

R (red) signal minus Y (luminance) signal; one of the color difference signals.

Reference video signal

A video signal which contains a sync signal or sync and burst signals, used as a reference for synchronization of video equipment.

Sawtooth waveform

A form of signal resembling the teeth of a saw. A video signal of sawtooth waveform is used to check linearity and other characteristics of video amplifiers.

Servo (or servomechanism)

In a VTR, a mechanism to control the number and phase of revolutions of the head drum (drum servo) or those of the capstan (capstan servo) so that the video heads scan the tape in the same pattern during recording and playback. Normally a vertical sync signal is used as the reference signal for these servocontrols.

Servo lock

In a VTR, to lock (or synchronize) the operation of the servomechanisms to a reference sync signal. *See also* Servo.

Shutter speed

The length of time for which the shutter stays open. The higher the shutter speed is, the more clearly a moving object can be shot.

Smear

See Vertical smear.

SMPTE

Society of Motion Picture and Television Engineers, a professional association established in the U.S.A. mainly for the purpose of setting forth motion picture and television engineering standards.

S/N

Signal-to-Noise ratio. The relation of the strength of the desired signal to the accompanying electronic interference, the noise. If S/N is high, sounds are reproduced with less noise and pictures are reproduced clearly without snow.

Time code

A digitally encoded signal that is recorded on videotape to identify each frame of video by hour, minute, second and frame number. SMPTE time code is applied to NTSC system, and EBU time code to PAL and SECAM systems. There are two kinds of recorded signal: longitudinal time code (LTC) and vertical interval time code (VITC). *See also* LTC and VITC.

Time code lock

To synchronize the built-in time code generator of video equipment such as a VTR to an external time code.

Tracking

An electronic adjustment of VTR's video heads during playback so that they correctly scan the video tracks on the tape. Without precise tracking, the playback signal will be weaker and the signal-to-noise ratio (S/N) lower, resulting in snowy reproduced picture especially when playing back the tape with a VTR other than the one used for recording.

User bits

A total of 32 bits are provided in time code which you can use to record such information as date, scene number, or reel number on videotape.

VBS

Video, Burst, and Sync. A composite signal consisting of video signal, burst signal and sync signal.

Vertical smear

A bright vertical line which appears on the screen when shooting a very bright object with a CCD camera. Also called smear.

Video gain

Amount of amplification for video signals, expressed in decibels (dB).

Viewfinder

A video monitor attached directly to a video camera.

VITC

Vertical Interval Time Code. A time code recorded on videotape in two horizontal lines during each vertical blanking period of a video signal. Unlike LTC, VITC is recorded in the same tracks as the video information, so they can be read even while the tape is not moving. *See also* Time code and LTC.

White balance adjustment

In the light of a particular color temperature, to adjust the white levels of the R, G, and B channels of a color video camera so that any white object shot in that light is reproduced as a truly white image. *See also* Color temperature.

White shading

When shooting a white object, the upper and lower portions of the screen may appear magenta or green while the central portion appears white, depending on the performance of the camera lens. This is called white shading.

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